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An Evaluation of Restorative Maintenance on Exhaust Emissions of 1975-1976 Model Year In-Use Automobiles

Calspan Corp, Buffalo, N Y

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AN EVALUATION OF RESTORATIVE MAINTENANCE ON EXHAUST EMISSIONS OF 1975-1976 MODEL YEAR IN-USE AUTOMOBILES

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This report describes the results of an automobile exhaust emission testing program conducted by the U.S. Environmental Protection Agency. The purpose of the program was to go beyond EPA's basic surveillance testing to determine the reasons for the difference in emission levels between vehicles on the road and their pre-production counterparts in certification. A total of 300 vehicles were subjected to a series of tests before and after various stages of tune-up. The vehicles were low-mileage 1975 and 1976 models of the three major domestic manufacturers and were obtained from private owners. The testing was performed in three cities by independent laboratories under contractor to EPA. Significant findings include the confirmation of the relatively poor emission performance of newer vehicles, the wide extent of maladjustments and disablements and the large emission reductions possible upon correction of these problems.

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1.0 INTRODUCTION

The purpose of the Restorative Maintenance (RM) program is twofold: to determine the apparent reasons for the poor emission performance of the 1975-1976 model year vehicles and to examine and quantify the individual and combined effects of malperforming emission components on emissions and fuel economy. To this end, the analysis is performed individually for hydrocarbons (HC), carbon monoxide (CO), nitrous oxides (NO_x), and for urban and highway fuel economies. The data are analyzed separately by manufacturer and by city as well as for all vehicles combined.

1.1 Background

The Environmental Protection Agency (EPA) conducts annual vehicle emission test programs, the Emission Factor Programs (EFP), for the purpose of estimating the average emissions from a nationally representative sample of in-use vehicles. The emissions data are used by various Federal, State, and local agencies for the purpose of estimating the impact of light duty vehicle emissions on air quality. Results of 2 recently completed EFP indicated that a large percentage, approximately 60 percent, of the 1975 model year vehicles in as-received condition have emissions above the 1975 Federal Standards after only one year of use. The 1975 model year was the first model year with large numbers of catalyst equipped vehicles. Similar results from the most recent EFP indicate that approximately 55% of the 1976 model year vehicles fail the Federal Standards after only one year of use.

Attempts were made to determine the probable reasons for the high failure rate of 1975 and 1976 cars using existing data for investigation. However, the purpose and design of the EFP do not include the needed measurements, emission component checks, and emission tests to precisely determine the causes of high emissions. The RM program was specifically designed to address the concerns about the high failure rate of the 1975 and 1976 model year vehicles.

1.2 Purpose and Design of the RM Program

There are two purposes for the Restorative Maintenance Study:

1. To go beyond the basic Emission Factor testing in determination of apparent reasons for emission malperformance of in-use vehicles.

2. To investigate and quantify the individual and combined effects of defects, disablement or maladjustment actions on exhaust emissions and fuel economy.

As a result of this program, EPA will:

1. Be able to assess the effectiveness of the present Light Duty Vehicle Certification Process in relationship to the performance of defect-free, properly tuned, in-use vehicles.

2. Provide background for planning which could result in further requirements for refinement of powerplants and emission control devices. An example of this may be a mandated restriction on the adjustment of sensitive engine parameters such as idle mixture and basic ignition timing.

3. Generate information which can be used in planning for Inspection and Maintenance (I/M) programs, Selective Enforcement Audit (SEA) and Recall.

This program is not expected to be able to assess who is responsible for any maladjustments or disablements. However, since vehicles were tested for driveability and owners were questioned as to the maintenance practices, the program may begin to give some insight into why a large percentage of 1975/76 vehicles are maladjusted or have emission components disabled.

Three hundred vehicles were tested in the RM Program, 100 vehicles from each of three metropolitan areas; Chicago, Detroit, and Washington. Independent testing laboratories under contract to the EPA performed the testing. Three major domestic automobile manufacturers were represented equally at each city location. Sales-weighting techniques were used to specify the models and engines to be evaluated. Vehicles from the 1975 and 1976 model years were selected from the general public at random with the requirement that they were less than twelve months old and had accumulated fewer than 15,000 miles. In addition, the owners were asked questions to preclude vehicles which had been abused or extensively modified and to ascertain how the vehicle had been used and maintained and how well the vehicle performed.

Once accepted into the program, a varying number of tests were performed on each vehicle according to the test plan. Each of the tests was separated from the following test by a decision point and an appropriate action. Individual test sequences consisted of a 1975 Federal Test Procedure (FTP) followed by a Highway Fuel Economy Test (HFET) and five short cycle tests. This 1975 FTP was modified to exclude the evaporative emissions and the extensive preconditioning procedures used in certification of the vehicle. The short cycles were ones which are currently being employed or considered for I/M programs by a number of state and local agencies. The contractor also evaluated the driveability of each vehicle as part of each test sequence.

A varying number of test sequences were performed on each vehicle, depending upon whether the vehicle failed the FTP on the preceding sequence and whether it required correction of a malperforming emission control item or scheduled maintenance. The full test sequence consisted of four steps: an initial test sequence, a sequence following correction of maladjustments and disablements other than idle mixture and idle speed, a test sequence after these idle settings were readjusted, and a fourth sequence after the restoration of all emission control components in conjunction with a complete tune-up.

Certain test vehicles were then subjected to further test sequences. Each vehicle selected at this point in the program had met the FTP standards. Most had received a complete tune-up, although some were accepted for additional testing after a successful emission component inspection. The vehicles were then subjected to "selective maladjustments" where a single engine parameter, e.g., ignition timing, or a specified combination of parameters was maladjusted or disabled. Table A-102 provides a flow chart and narrative of the Restorative Maintenance Program test plan.

2.0 SUMMARY AND CONCLUSIONS

The following results have been obtained by analysis of the Restorative Maintenace (RM) program data:

1. For the 300 vehicles tested, 74% have at least one malperformance of an emissions related component or system.

2. Chrysler vehicles have the largest percentage, 96%, of at least one malperformance and 94% of all Chrysler vehicles have a malperformance of the carburetor/fuel system.

3. Of the nine emission related systems investigated, the carburetor/fuel system contributes the largest percentage, 66%, of malperformances.

4. The emissions related components of the carburetor/fuel system with the largest percentages of malperformance are: disabled limiter caps, maladjusted idle mixture screws, maladjusted idle speed settings, and maladjusted choke assemblies.

5. Certain combinations of malperforming components, particularly within the carburetor/fuel and ignition systems, correlate with vehicles failing the standards, although the exact relationship between combinations of malperforming emission components and their additive or multiplicative effect upon emissions is not yet known.

6. Seventy-two percent of the 300 vehicles were outside at least one specification tolerance for either idle RPM, idle CO or timing, and 93% of all Chrysler vehicles were outside of at least one specification tolerance.

Seventy-six percent of all Chrysler vehicles were outside of the idle CO specification (that is, had tailpipe idle CO greater than .5%).

7. General Motors vehicles with tailpipe idle CO greater than .5% correlate with the failure of a GM vehicle to meet the CO standards 90% of the time. The same is true for Chrysler vehicles 74% of the time and for Ford vehicles only 44% of the time.

8. It appears that disablement of the EGR valve or lines strongly correlates with the failure to pass NOX standards.

9. A significant change in emissions levels due to adjustment or maladjustment of emission components outside their specification tolerances is not necessarily accompanied by a significant change in fuel economy.

10. Adjustment of the vehicle within accepted specification tolerances does not imply acceptable driveability quality.

11. Disablement and maladjustment of any emission components thought to be typical for a certain type of vehicle almost always resulted in the failure of a vehicle to meet the standards.

12. The overall ability of the short cycle tests to pass or fail a vehicle as compared to the FTP is best for the Federal Short Cycle Test.

13. Investigation of the distribution of emissions shows that they are log-normally distributed as in Figure 2-1, following:

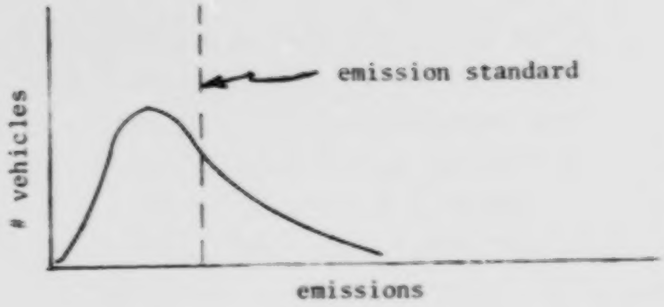

Figure 2-1 LOG-NORMAL EMISSIONS

The median measurement (the 50th percentile) of a log-normal distribution is equal to the geometric mean, exp $\left(\frac{\sum \ln x}{n}\right)$, of the measurements. A set of measurements whose distribution follows the log-normal will have an arithmetic mean that is greater than the median (or geometric mean). The arithmetic mean emission value is used in air-quality projections. The log normal distribution is used in the prediction of percent of vehicles failing standards.

(14) Investigation of the distribution of emissions for vehicles with tailpipe idle CO less than or equal to .5% and for vehicles with tailpipe idle CO greater than .5% shows that, for the most part, vehicles with high tailpipe idle CO correlate with vehicles failing the standards, and the vehicles with less than or equal to .5% correlate with vehicles passing the standards as demonstrated in Figure 2-2 below.

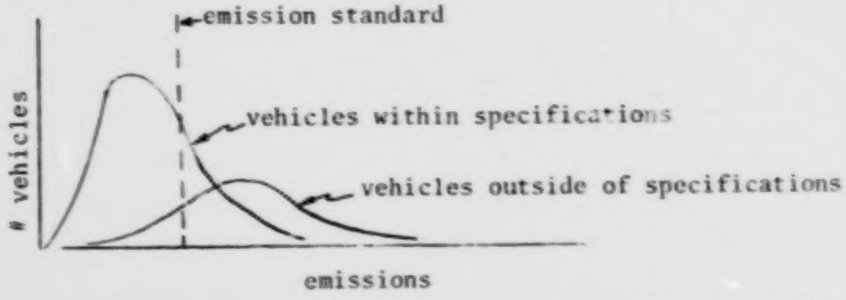

Figure 2-2 EMISSIONS WITHIN AND OUTSIDE OF SPECIFICATIONS

There is little doubt that vehicles with high tailpipe idle CO (or vehicles outside any of the specifications for idle RPM and timing) contribute to the log-normality of the distribution of emissions for all vehicles, although it cannot be ascertained if vehicles outside of specifications contribute exclusively to the log-normality of the entire distribution. Whereas, the effect of being outside of just the idle CO specification on emissions was determined, the interrelationships between idle CO, idle RPM and timing, and their combined effect upon emissions as the three vary, cannot be determined, although the implication is that they vary multiplicatively.

(15) The interrelationships between malperforming emission components and their effect on emissions was strikingly highlighted by investigation of the emission behavior of one vehicle: a 1976 GM Seville. When the Seville was tuned to manufacturer's specifications, it passed all FTP standards. When several components were intentionally maladjusted (i.e., plugging the EGR line, disabling the air pump, supplying full vacuum advance to the distributor and advancing the timing to +15 degrees), the Seville failed the FTP only because of high NOX emissions. After the Seville was restored to manufacturers' specifications and again passed the FTP standards, only the EGR valve was disabled. The result was that the Seville failed the FTP because of high NOX and high CO emissions. Although this is the result for investigation of one vehicle, it does demonstrate the tendency noted throughout the RM program; that combinations of malperformances, whether disablements, defects of maladjustments, and combinations of varying degrees or deviations from all specifications, can result in increases in emissions that may be different than the additive effects of individual malperformances or deviations from specifications.

3.0 ANALYSIS OF THE PERFORMANCE OF THE EMISSION RELATED SYSTEMS

The percent of emission component and/or system malperformances given in this report are slightly inaccurate due to a number of minor changes made to the data. These changes were made after the analysis given in this report was completed. The changes that have occurred usually were the result of a manufacturer representative's suggestion or clarification concerning emission component functions. For example, the manufacturer representative may have pointed out that a particular component was able to function but did not function when the vehicle was tested due to a malperformance in a distinct although associated component. Most cases such as this were caught early in the program but some further problems were found during more extensive review. In no case will the rate of malperformance given in this report deviate from the correct rate of malperformance by more than two percentage points. Therefore, the conclusions given in this report regarding emission component malperformance are still valid. The report was not redone because the small error involved did not warrant the amount of work, cost, and time that would be required to update the rates of malperformances given throughout the report. The emission measurements were not affected by these changes and are accurate as given.

The focus of the following analysis will be the performance of each emission related system and each system component or subsystem. The purpose is to investigate the emission systems and subsystems which do not perform properly, to determine the frequencies or rates of malperformance for these systems, to define types of malperformances and to delineate the specific reasons for malperformance.

This analysis is conducted on all three hundred vehicles after they complete their first test sequence in the Restorative Maintenance (RM) program. The results of this section of the analysis are embodied in Tables A-1 through A-100 in Appendix A as well as in summary tables in the text. Included are analyses by each major emission related system, by each component or subsystem, by city, by manufacturer, by vehicles passing the initial test, by vehicles failing the initial test, and by vehicles whose emissions are extrapolated to 50,000 miles. Possible relationships between malperformances, vehicle mileage, and cubic inch displacement were investigated and are reported wherever significant.

Nine major emissions related systems were examined for malperformance of their subsystems or components. The following list displays the nine systems and the components that were investigated in each system.

Emission Related Systems	Emission Components for Given System
Induction System	Heated Air Inlet Door Heated Air Inlet Diaphragm Temperature Sensors, Switches, Modulators Delay Valve Air Filter Element Hoses, Tubes, Lines, Wires
Carburetor/Choke/Exhaust Heat Control Valve System	
Carburetor Subsystem	Carburetor Assembly Limiter Caps Tailpipe ICO Idle Speed External Idle Enrichment Idle Stop Solenoid Dashpot and Other Throttle Modulators Fuel Filter Element Hoses, Lines, Wires
Choke Subsystem	Choke Adjustment Vacuum Diaphragm Electrical Controls Hoses, Lines, Wires
Exhaust Heat Control Valve Subsystem	Exhaust Heat Control Valve Assembly Actuating Diaphragm Coolant Temperature Sensing Switches Check Valve Hoses, Lines, Wires
Ignition System	Distributor Assembly Initial Timing Spark Plugs and Their Wires Vacuum Advance Diaphragm Spark Delay Devices Coolant Temperature Sensing Switches Hoses, Lines, Wires Dwell

EGR System	EGR Valve Assembly EGR Valve Backpressure Transducer EGR Time Delay Solenoid Venturi Vacuum Amplifier High Speed Modulator Vacuum Reservoir Coolant Temperature Sensing Switches Hoses, Lines, Wires
Air Pump System	Air Pump Assembly Bypass and/or Dump Valves Check Valve Electrical PVS Solenoid Vacuum Valve Floor Pan Switch Vacuum Differential Control Drive Belt, Attaching Hardware Hoses, Lines, Wires
PCV System	PCV Valve Assembly Filters Hoses, Lines, Wires
Exhaust System	Exhaust Manifold, Tailpipe, Muffler Catalyst
Evap Control System	Evap Canister Canister Filter Hoses, Lines, Wires
Engine Assembly/Miscellaneous	Engine Assembly Engine Oil and Filter Cooling System Mechanical Valve Adjustment Carburetor and Intake Manifold Mounting Bolts Belt Tensions Hoses, Lines, Wires

Tables A-1 through A-100 present the percent of vehicles with each type of performance for each subsystem of each major emission related system by city and manufacturer. The performance of each system or component in its as-received condition is defined by one of 8 performance codes which are defined on each of the Tables A-1 through A-100. The performance codes are as follows:

1 - no malperformance
3 - not applicable to particular vehicle
4 - maladjusted
5 - disabled
6 - defective
7 - inadequate or improper maintenance
8 - improper part - misbuild
9 - failure of non-OEM part

The performance codes used for components and systems in this program were determined in accordance with the following reasoning:

No Malperformance: The component or system was present, inspected and found to be operating properly. This code was also used in cases where the component or system was not able to be inspected, but where there was no evidence that it was not operating properly. An example of this is mechanical valve adjustment on a vehicle which passed early in the sequence and was released without an actual inspection.

Maladjusted: This refers to an adjustable component or system which was found to be outside of the tolerance band around the nominal specification. Examples are idle speed, basic timing, and choke settings. Acceptable ranges for the idle speed were ±100 rpm while ±2° was used for basic timing. Allowable ranges for choke adjustments were the production tolerances as provided by the manufacturer's representative.

Solely for the purpose of coding and analysis in this program, as-received idle mixture adjustment was judged on the basis of a 0.5% tailpipe idle CO cutpoint. This treatment had no impact on the actual vehicle testing which was performed according to manufacturers' specifications but is useful in making comparisons among the various vehicles and in the evaluation of a basic idle mode short test.

Disabled: A component or system which is found not to be functioning properly due to some person's willful or inadvertent action. Examples are plugged, disconnected, or rerouted vacuum lines, carefully damaged EGR valves, and broken or missing limiter caps.

Defective: A component which is found not to be functioning properly due to a manufacturing fault or normal deterioration prior to any service interval. Examples of these are leaking vacuum diaphragms, coolant temperature sensing vacuum switches which do not open or close at appropriate temperatures, timing devices which stay on or off too long or too short, and broken EGR backpressure transducers.

This code is also used when the condition of the component or system cannot be absolutely determined by the basic functional checks prescribed in the program but a replacement and a subsequent emission test reveals a significant difference in emission levels. This was the case where carburetor replacements corrected a high CO problem.

Failure Due to Inadequate or Improper Maintenance: A component or system which is not functioning properly due to the owner's neglect. Examples of this are a dirty air cleaner, or lack of spark plug change at a specified time. This code is only used in those cases where the condition was determined to have a significant effect on exhaust emission levels.

Improper Part Due to Misbuild: Lacking any firm evidence of replacement after production, this is the determination that the component present was not the correct one for the engine family/emission control system applicable to the test vehicle. An example of this is an instance in which the test vehicle was equipped with non-resistor spark plugs when resistor type are specified.

Failure of Non-OEM Part: A failed component which is not an exact replacement of original equipment. An example of this is an after-market brand of spark plug which has fouled. Normally, however, such components which were found to be operating properly received a "pass" rating.

3.1 A DISCUSSION OF MALPERFORMANCE OF ALL VEHICLES TAKING THE INITIAL TEST BY CITY AND MANUFACTURER

The rates of malperformances given in this section are expressed as a percent of the total number of vehicles being considered, not as a percent of the total number of vehicles that are equipped with a given component. The rates of malperformance will be expressed in this way throughout this report unless it is stated otherwise.

Of the nine emission related systems investigated, the carburetor/fuel system contributes the largest percentage of malperformances, 66%, of any major system, followed by the ignition system, 26%, the exhaust gas recirculation system, 15%, and the induction system, 6%. All remaining systems have less than a 2% level of malperformance as indicated by Tables III-1 and III-2. For all three hundred vehicles tested, 74% have at least one malperformance.

Analysis of malperformance by city indicates no relationship between the two, but analysis of malperformance by manufacturer, Table III-2, indicates that Chrysler vehicles have the largest percentage of malperformance as compared to General Motors and Ford. For the carburetor/fuel system, Chrysler has a 94% rate of malperformance as compared to 56% for Ford and 49% for General Motors. For the ignition system, Chrysler has a 32% rate of malperformance as compared to 25% for Ford and 21% for General Motors. For the exhaust gas recirculation system, Chrysler and Ford have about the same rate of malperformance, 19% and 18% respectively, with General Motors at 9%. Ford and Chrysler vehicles have the largest rates of malperformance with 9% for the induction system, followed by General Motors with about 2%. Overall, Chrysler has a 96% rate of at least one malperformance followed by Ford with 69% and General Motors with 59%. Whereas the carburetor/fuel system is undoubtedly the biggest contributor to malperformance for all vehicles, this system's malperformance is especially significant for Chrysler vehicles.

Tables A-1 through A-18 present the percent of vehicles with each type of performance for each component or subsystem of each major emission related system. In each table, all the codes for each type of performance are presented for completeness whereas only codes 4 through 9, inclusive, are considered a malperformance. The reader should be informed that not every manufacturer employs every subsystem or component indicated in the tables. Therefore, in assessing the percentage of vehicles with a particular malperformance for a component or subsystem, one must check to see if all vehicles are equipped with the component. Code 3 of the performance codes in each table indicates that the vehicle is not equipped with the subsystem or component indicated. For instance, the external idle enrichment listed in Table A-4 for the carburetor/fuel system does not apply to any of the General Motors or Ford vehicles and does not apply to 41.4% of the 99 Chrysler vehicles. That is, only 58 of the 99 Chrysler vehicles employ external idle enrichment and 55 of the 58 have no malperformance. One of the 58 vehicles has a disabled idle enrichment and two of the 58 vehicles have a defective idle enrichment.

Analysis of the induction system, Tables A-1 through A-2, indicates that most of the malperformances, 4%, were due to disablement of hoses, tubes, and wires. Table III-3 is a summary of the significant systems and subsystems contributing to malperformance.

Analysis of the carburetor/fuel system, Tables A-3 and A-4, indicates that the components with the largest percentage of malperformances are the limiter caps, the idle mixture adjustment, the idle speed, and the choke adjustment. The limiter caps were disabled on 45% of the vehicles, the idle mixture was maladjusted on 38% of the vehicles, the idle speed was maladjusted on 25% of the vehicles, and the choke was maladjusted on 10% of the vehicles. There were very few defective components in the carburetor/fuel system and these were scattered over 6 of the 16 remaining subsystems.

Further analysis by manufacturer, Table A-4, reveals that limiter caps were disabled on 70% of all Chrysler vehicles as compared to 36% for Ford and 30% for General Motors. The idle mixture adjustment was maladjusted on 71% of all Chrysler vehicles as compared to 15% for Ford and 27% for General Motors. The idle speed was maladjusted on 31% of all Chryslers as compared to 24% for Ford and 19% for General Motors. There seems little doubt that the high malperformance rate for Chrysler is a result of the large number of maladjusted idle mixtures and idle speeds.

Tables A-5 and A-6 present results of the ignition system by city and manufacturer. These tables indicate that the initial timing was maladjusted on 19% of all vehicles. Washington had a slightly higher rate with 26% of Washington vehicles having maladjusted timing. Approximately 19% of the General Motors, Ford, and Chrysler vehicles had maladjusted timing.

Tables A-7 and A-8 present results of the exhaust gas recirculation (EGR) system and indicate that 14 of the 68 vehicles, or 21% (mostly Fords), equipped with an EGR valve backpressure transducer were defective. Also 2 of the 40 Chrysler vehicles, or 5%, equipped with an EGR time delay solenoid were defective. Approximately 8% of the Chrysler vehicles were found with a disabled EGR valve. There were no General Motors vehicles equipped with disabled or defective EGR valves and only 2 Chryslers and one Ford were equipped with a defective EGR valve.

Analysis of combinations of malperforming emissions related systems was performed and the results may be noted in Tables A-19 and A-20. Note that the analysis determines how many vehicles have a malperformance in two different systems simultaneously. The largest frequency of malperformance for combinations of systems occurs between the carburetor/fuel system and the ignition system with 65 of 300 vehicles having both malperforming carburetor/fuel systems and ignition systems. The next largest frequency of malperformance, 35 out of 300 vehicles, for a combination of systems occurs between the carburetor/fuel system and the exhaust gas recirculation system. The ignition and exhaust gas recirculation systems and the induction and carburetor/fuel systems have 16 of 300 vehicles and 15 of 300 vehicles with malperformances in both system combinations, respectively. The implication of this analysis is that almost all, 65 of the 79, vehicles with ignition system malperformances also have carburetor/fuel malperformances. Also, 35 of the 46 vehicles with exhaust gas recirculation malperformances also have carburetor/fuel malperformances. Only 16 of the 46 vehicles with exhaust gas recirculation malperformances also have ignition malperformances, but 15 of the 19 vehicles with induction system malperformances also have carburetor/fuel system malperformances. The conclusion is that the vehicles with either ignition, exhaust gas recirculation, or induction system malperformances, most probably also have carburetor/fuel system malperformances.

To further clarify which combinations of components or subsystems result in malperformances, Table III-4 is offered only for the significant combinations of components or subsystems for maladjusted and disabled components for all vehicles.

Table III-4 indicates that 93 of the 300 vehicles or 31% have both disabled limiter caps and maladjusted idle mixtures. Presented another way, 93 of the 113 vehicles (82%) with maladjusted idle mixtures also have disabled limiter caps. Thirteen percent or 39 of 300 vehicles have both disabled limiter caps and maladjusted idle speeds. Ten percent of all vehicles or 31 of 300 vehicles have both maladjusted idle mixtures and maladjusted idle speeds. Also, 8% or 23 of 300 vehicles have both maladjusted chokes and idle mixtures. Six percent or 19 of 300 vehicles have both disabled limiter caps and maladjusted chokes.

Comparisons of malperformance for both the carburetor/fuel and ignition systems show that 33 of 300 vehicles, or 11%, of all vehicles have both disabled limiter caps and maladjusted timing. Nine percent or 26 of 300 vehicles have both maladjusted idle mixtures and timing, and 6% or 18 of 300 vehicles have both maladjusted idle speed and timing.

Comparisons of malperformances for both the carburetor/fuel and EGR systems show that 9 of 300 vehicles have both disabled limiter caps and disabled or defective EGR valves. Also, 9 of 300 vehicles have both maladjusted idle mixtures and disabled or defective EGR valves.

Comparisons of malperformances for both the carburetor/fuel and induction systems show that 8 of 300 vehicles have both disabled hoses, tubes and wires, and disabled limiter caps.

The above results confirm the interdependency of the subsystem of the ignition, EGR and induction systems with the subsystems or components of the carburetor/fuel system. Thus, not only have the major emission related systems producing malperformances been reduced to the carburetor/ fuel, ignition, EGR and induction systems, but the components or subsystems within each major system that produce the majority of the malperformances have been defined.

The specific reasons for component/subsystem malperformance are listed in Table A-101. The table also indicates the frequency of occurrence of the various causes of the component or subsystem malperformances.

3.2 A DISCUSSION OF MALPERFORMANCES FOR VEHICLES PASSING THE INITIAL RESTORATIVE MAINTENANCE TEST BY CITY AND MANUFACTURER

Of the 300 vehicles that took test 1, the as-received test, of the RM program, only 125 or 41.7% passed all three emissions standards. Any emission values less than or equal to 1.5 gm/mi. HC, 15 gm/mi. CO, and 3.1 gm/mi. NOX were called passing vehicles in this report. When certified, the 1975 and 1976 model year vehicles were determined to pass if their emissions were less than 1.55 gm/mi. HC, 15.5 gm/mi. CO, and 3.15 gm/mi. NOX. Therefore, the passing rates given in this report may be slightly lower than those that would result from using the cutpoints as used in the certification procedure. The small difference in passing rates will not alter the conclusions of this report. It is the purpose of this section to explore the relationship between vehicles with emission component malperformances and vehicles that passed the emissions standards. Vehicles that passed the standards are not necessarily free of emission component malperformances.

The effect of an individual emission component or system malperformance on emission levels and FTP failure rates cannot be estimated from the results given in this section. Further on, in Section 5.3, there is some discussion of individual malperformances on emission levels. The vehicles that have malperformances in a particular component or system may also have malperformances in other systems. Because of the multiple system and/or component malperformances, it is not possible to estimate the effect of an individual system malperformance on emissions with the results of this section. The results given here are an estimate of the combined effect of malperformances on emissions and failure rate.

Tables III-5 and III-6 present the percent of malperformance by city and manufacturer, respectively, for vehicles that passed the initial test. The carburetor/fuel system has the largest rate of malperformance, 41%, for passed vehicles, followed by the ignition system with 13%, the induction system with 6% and the exhaust gas recirculation system with 4%. All remaining systems have a malperformance rate less than 1%. For all 125 vehicles that passed the initial test, 50% have at least one malperformance. For three of the four systems accounting for the majority of malperformances, the percentage of vehicles passing the initial test with a malperformance is significantly less as compared to the percentage of vehicles with a malperformance for all vehicles. Only for the induction system does the percentage of vehicles with a malperformance remain the same at 6%.

Table III-5 reveals that about the same number of vehicles pass the initial test in each of the three cities. Also, about the same percentage of vehicles have the same rate of malperformance in each emission related system for each city. Table III-6, however, reveals that the number of vehicles passing the initial test by manufacturer is greatly different for Chrysler vehicles with 17 passing than for either General Motors or Ford, each with 51 and 57 passing, respectively. Of significant importance is that, although only 41% of all passed vehicles have a malperformance for the carburetor/fuel system, 88% of Chrysler vehicles have a carburetor/fuel system malperformance. Only 44% and 22% of Ford and General Motors vehicles respectively have a carburetor/fuel system malperformance.

A comparison of these carburetor/fuel system malperformance percentages for vehicles that passed test 1 with the percentages for all vehicles taking the initial test reveals that Chrysler vehicles have about the same rate of malperformance, with Ford and General Motors vehicles having a much smaller rate of malperformance for passed vehicles. Examination of passed vehicles, with at least one malperformance by manufacturer, reveals that Chrysler vehicles have an 88% rate of at least one malperformance as compared to 56% and 31% for Ford and General Motors, respectively.

Review of the individual subsystems within each of four major emission related systems producing malperformances, see Tables A-21 through A-32, shows that the following subsystems or components contribute the following rates of malperformance for the 125 passed vehicles: 19% with disabled limiter caps, 9% with maladjusted idle mixtures, 18% with maladjusted idle speeds, 7% with maladjusted chokes, 10% with maladjusted timing, 0% with disabled or defective EGR valves, 3% with a defective EGR valve transducer, and 4% with disabled hoses, tubes and wires related to the induction system. The rates of malperformances for subsystems shows that these rates are less for passed vehicles in their as-received condition as compared to the rates for all vehicles in their as-received condition. Tables A-21 through A-38 present the performance codes for all subsystems of the major systems for passed vehicles.

An investigation of which combinations of systems result in malperformance is displayed in Tables A-39 by city and A-40 by manufacturer. Nine of the 125 passed vehicles, or 7%, have malperformances in both the ignition and carburetor/fuel systems. Six of the 125 passed vehicles, or 5%, have malperformances in both the induction and carburetor/fuel systems. Only 2 of the 125 passed vehicles, or 2%, have malperformances in both the exhaust gas recirculation and carburetor/fuel systems. The result is that there is a very small correlation between major emission systems for passed vehicles with malperformances. Before making too general a statement, the rates of malperformance for vehicles failing the initial RM test must be examined. Rates of malperformance for failed vehicles will be discussed in the next section.

Table III-7 is a summary of the significant systems and subsystems contributing to malperformances for vehicles passing the initial test by manufacturer.

3.3 A DISCUSSION OF MALPERFORMANCE OF VEHICLES FAILING THE INITIAL RESTORATIVE MAINTENANCE TEST BY CITY AND MANUFACTURER

Of the 300 vehicles that took test 1, the as-received test, of the RM program, 175 or 58.3% of all vehicles failed one or more of the emissions standards for hydrocarbons, carbon monoxide, and nitrous oxides. This section will investigate the rate of emission component malperformance for vehicles failing the initial test to determine if vehicles failing the initial test necessarily have a high rate of malperformance. Tables III-8 and III-9 present the rate of malperformance for all failed vehicles by city and manufacturer. The carburetor/fuel system has the largest rate of malperformance with 84%, followed by the ignition system with 36%, the exhaust gas recirculation system with 23%, and the induction system with 6%. For the 175 vehicles failing the initial test, 91% have at least one malperformance.

Table III-8 indicates that about the same number of vehicles fail the initial test in each city location. Also, for each particular emission related system, the rate of malperformance is approximately the same from city to city. Examination of the rates of malperformance by manufacturer, Table III-9, shows that Chrysler has the largest rate of at least one malperformance, with 98%, followed by General Motors and Ford, each with approximately 86%. Chrysler vehicles also have the highest rate, 95%, of malperformance in the carburetor/fuel system as compared to General Motors with 76% and Ford with 71%. There is little difference among manufacturers in the rate of malperformance for each of the remaining emission related systems examined individually.

A comparison of the rates of malperformance for the 175 failed vehicles with the rates of malperformance for all 300 vehicles indicates higher rates of malperformance for failed vehicles for the carburetor/fuel, the ignition and the exhaust gas recirculation systems. There is no difference in the rate of malperformance for failed vehicles as compared to all vehicles for the induction system. There are other emission related systems which show higher rates of malperformance for failed vehicles. However, the rates of malperformance for these systems, the air pump, positive crankcase ventilation, exhaust, evaporative and engine assembly systems are 2% or less.

Examination of the malperformances for the significant subsystems for failed vehicles, Tables A-41 through A-58, reveals the following rates and types of malperformance: 64% with disabled limiter caps, 58% with maladjusted idle mixtures, 30% with maladjusted idle speeds, 12% with maladjusted chokes, 26% with maladjusted timing, 6% with either a defective or disabled EGR valve, 6% with a defective EGR valve transducer, 11% with disabled EGR system hoses, lines and wires, and 4% with disabled induction system hoses, lines and wires. The rates and types of subsystem malperformance are greater for failed vehicles as compared to the rates and types of malperformances for all vehicles taking test 1.

Tables A-59 and A-60 present the frequencies of malperformance for combinations of emission related systems by city and manufacturer, respectively. Fifty-six of the 175 failed vehicles, or 32%, have both carburetor/fuel and ignition system malperformances. Thirty-three of the 175 failed vehicles, or 19%, have both carburetor/fuel and exhaust gas recirculation system malperformances. Sixteen of the 175 failed vehicles, or 9%, have both ignition and exhaust gas recirculation system malperformances and 9 of 175, or 5%, have both induction system and carburetor/fuel system malperformances. The result is that 56 of the 63 vehicles with ignition system malperformances also have carburetor/fuel system malperformances. Thirty-three of the 41 vehicles with exhaust gas recirculation malperformances also have carburetor/fuel system malperformances. Nine of the 11 vehicles with induction system malperformances also have carburetor/fuel system malperformances. Only 16 of the 41 vehicles with exhaust gas recirculation malperformances also have ignition system malperformances. One conclusion that may be made is that a failed vehicle with a malperformance in any or all of the following systems: the ignition, exhaust gas recirculation or induction systems, has at least an 80% chance of a malperformance in the carburetor/fuel system. Another, more obvious conclusion is that the carburetor/fuel system, either alone or in combination with other systems, contributes the largest rate of malperformance of any major emission related system for all manufacturers in all cities for vehicles failing the initial test.

Table III-10 presents a summary of the significant systems and subsystems contributing to malperformances for vehicles failing the initial test by manufacturer.

3.4 A COMPARISON OF MALPERFORMANCE FOR PASSED AND FAILED VEHICLES

The section investigates the relationship between the rate of malperformance and whether a vehicle will pass or fail the emissions standards. One-hundred and twenty-five vehicles pass the initial test and 175 vehicles fail the initial test. Let us define, m_p, as the number of emission component malperformances for vehicles passing the initial test, and, m_F, as the number of such malperformances for vehicles failing the initial test. Then, $(m_p/125)$ times 100% and $(m_F/175)$ times 100% would be the percentages or rates of malperformance for passed and failed vehicles, respectively.

Consider the case where $m_p = 0$ and $m_F = 175$. This case would imply that $(m_p/125)$ times 100% equals 0% and $(m_F/175)$ times 100% equals 100%. This would mean that all vehicles passing the emissions standards would be free of malperformances and that all vehicles failing the emissions standards would all have malperformances. Thus, the statistic defined by

$$(m_F/175 - m_p/125) \text{ times } 100\%$$

would equal 100% and all malperforming vehicles could be said to positively correlate with all vehicles failing the initial test.

Next, consider the situation where $m_p = 125$ and $m_F = 0$. Then the statistic $(m_F/175 - m_p/125)$ times 100% would equal -100% and all malperforming vehicles could be said to negatively correlate with all vehicles passing the initial test.

If no correlation existed between malperforming vehicles and vehicles that passed or failed the test, then $m_F/175$ would equal $m_p/125$ and the statistic $(m_F/175 - m_p/125)$ times 100% would be zero. Table III-11 presents a summary of the statistic $(m_F/175 - m_p/125)$ times 100% for a selected number of important systems and subsystems which have been shown in Sections 3.1, 3.2, and 3.3 to contribute to malperformance. The table also presents a breakdown by manufacturer since differences between malperformance by manufacturer were shown to exist in previous sections. Reporting of the correlations between malperformances and passed and failed vehicles by manufacturer cause the statistic reported to be generalized to

$$(m_F/F - m_P/P) \text{ times } 100\%$$

where F and P are the number of vehicles failing and passing the test, respectively, for each particular manufacturer.

The interpretation of Table III-11 is that most malperformances positively correlate with vehicles that failed the initial test, although some of the correlations are very weak. Malperformances of the induction system do not correlate with either a passed or failed vehicle. The carburetor/fuel system has the strongest correlation between vehicles with a malperformance and vehicles failing the initial test. Of the individual components, maladjustment of the idle mixture correlates the best with vehicles failing the test as compared to other components. Maladjustment of the idle mixture for any vehicle implies that the vehicle will also fail the emissions standards about 50% of the time. Of course, this failure rate for maladjusted idle mixtures varies from manufacturer to manufacturer. Maladjusted idle mixture on Chrysler vehicles implies that the same vehicles will also fail the emissions standards 57% of the time, while maladjusted idle mixtures for Fords will also fail the emissions standards only about 11% of the time.

Interpretation of these correlations for individual subsystems or components is not advised, however. Previous sections have shown the interrelationships between malperformances and combinations of emission systems and components. For instance, a maladjustment of the idle mixture might be accompanied by maladjustment of ignition timing and/or idle speed. The combined effect may result in emissions levels which may still pass the standards. The effects of changing or maladjusting certain components or combinations of components will be explored in later sections.

3.5 EXAMINATION OF MALPERFORMANCES OF PASSED AND FAILED VEHICLES WHOSE EMISSIONS ARE EXTRAPOLATED TO 50,000 MILES

The malperformance and emissions levels examined in the RM program are for a sample of 300 vehicles with mileages between 0 and 15,000 miles. Since 1972, new vehicles have been required to have emissions below the level of the applicable standard in order to be certified by the Federal government. Because of depreciation of a vehicle's engine and accompanying control equipment (carburetor/fuel system, ignition system, EGR system, etc.) with time and mileage, emissions are expected to change. Many studies[1,2,3] have been conducted on various groups of vehicles as a function of mileage and age to determine the rate at which emissions deteriorate. Generally, the results of these studies indicate that hydrocarbons and carbon monoxides increase with increasing mileage. While NOX emissions decreased or remained constant with time, prior to the introduction of NOX control, trends for NOX controlled vehicles are not clear.

Results of deterioration studies show that linear regressions of emissions with mileage are adequate to define the deterioration factors for groups of vehicles. These deterioration factors were determined from certification durability data and are expressed as the ratio of the 50,000 mile emissions levels to the emissions levels at the 4,000 mile or break-in point. The 50,000 mile figure is used since in order to be certified, vehicles must comply with the standards at 50,000 miles. Thus, the predicted emissions levels for each RM vehicle at 50,000 miles can be calculated, through interpolation, using the certification deterioration factor and the RM vehicle emissions at the known test mileage. Deterioration factors less than 1.0 were set equal to 1.0 for this analysis since it was assumed that all emissions increased or remained constant over the 4,000 to 50,000 mile range.

Since deterioration increases the emissions for the vehicle sample under consideration in the RM program, more vehicles will fail the initial RM test if deterioration is taken into account. Tables III-12 through III-15 present the malperformance rate for those vehicles projected to pass and fail standards at 50,000 miles by city and manufacturer. Of course, the percent of malperformances that would occur on the RM vehicles when they are at 50,000 miles is unknown. The tables in this section merely isolate the percent malperformance (at the RM test point) for that group of vehicles projected to pass and/or fail standards at 50,000 miles. The rate of malperformance (at the RM test point) for these vehicles is investigated to determine whether the distribution of malperformances is different for these vehicles than for vehicles that pass or fail at the time of the RM test. Section 3.4 demonstrated a positive correlation between vehicles with malperformances and vehicles failing the initial test. Discussions in this section will determine if the correlation between malperformances and vehicles that are projected to pass or fail at 50,000 miles is different as compared to the relationships determined in 3.4.

Tables III-12 through III-15 show that only 102 vehicles pass the initial RM test assuming deterioration to 50,000 miles. Therefore, 198 vehicles are projected to fail the initial test at 50,000 miles. The rate of malperformance for the carburetor/fuel system for those vehicles projected to pass at 50,000 miles is 38% as compared to 11% for the ignition system, 7% for the induction system, and 3% for the EGR system. The rate of malperformance for the carburetor/fuel system for those vehicles projected to fail at 50,000 miles is 80% as compared to 34% for the ignition system, 22% for the EGR system, and 6% for the induction system.

The malperformance rate is higher for those vehicles projected to fail than for those vehicles projected to pass at 50,000 miles for the carburetor/fuel system, the ignition system and the exhaust gas recirculation system. There is no significant difference in the rate of malperformance for the induction system between the projected passed and failed vehicles at 50,000 miles.

Tables A-61 through A-100 present the performance rates for each subsystem of each emission related system by city and manufacturer for vehicles projected to pass and for vehicles projected to fail at 50,000 miles. Table III-16 presents the correlation between malperformances and the projected passed or failed vehicles at 50,000 miles by manufacturer. Tabulated in

Table III-16 are the differences in performance rates between failed and passed vehicles as in Section 3.4. Comparison of the percents of correlation between the vehicles in Table III-11 in Section 3.4 with mileages between 0 and 15,000 and the vehicles in Table III-16 all with mileages of 50,000 show little change in the correlations between malperformances and failed vehicles for the subsystems investigated.

TABLE III-1 PERCENT OF MALPERFORMANCE BY CITY GROUP FOR EACH EMISSION SYSTEM

		EMISSION RELATED SYSTEM									
CITY	**# CARS**	**INDUCTION**	**CARBURETOR FUEL**	**IGNITION**	**EXHAUST GAS RECIRCULATION**	**AIR PUMP**	**POSITIVE CRANKCASE VENTILATION**	**EXHAUST**	**EVAPORATIVE**	**ENGINE ASSEMBLY & MISCELLANEOUS**	**AT LEAST ONE MALPERFORMANCE**
CHICAGO	100	8.00	63.00	20.00	16.00	0.00	1.00	0.00	2.00	0.00	71.00
DETROIT	100	7.00	66.00	25.00	12.00	2.00	1.00	0.00	2.00	3.00	76.00
WASHINGTON	100	4.00	69.00	34.00	6.00	0.00	0.00	0.00	0.00	0.00	76.00
TOTAL	300	6.33	66.00	26.33	15.33	0.67	0.67	0.00	1.33	1.00	74.33

TABLE III-2 PERCENT OF MALPERFORMANCE

BY MANUFACTURER FOR EACH EMISSION SYSTEM

MANUFACTURER	# CARS	EMISSION RELATED SYSTEM									AT LEAST ONE MALPERFORMANCE
		INDUCTION	CARBURETOR FUEL	IGNITION	EXHAUST GAS RECIRCULATION	AIR PUMP	POSITIVE CRANKCASE VENTILATION	EXHAUST	EVAPORATIVE	ENGINE ASSEMBLY & MISCELLANEOUS	
GENERAL MOTORS	102	1.96	49.02	21.57	8.82	0.00	0.00	0.00	0.98	0.00	58.82
FORD	99	9.09	55.56	25.25	18.18	2.02	1.01	0.00	1.01	2.02	68.69
CHRYSLER	99	2.67	93.94	32.32	19.19	0.00	1.01	0.00	2.02	1.01	95.96
TOTAL	300	6.33	66.00	26.33	15.33	0.67	0.67	0.00	1.33	1.00	74.33

TABLES III-3 FREQUENCY OF DISABLED, MALADJUSTED, AND DEFECTIVE COMPONENTS OR SUBSYSTEMS BY MANUFACTURER

	Subsystems of Carburetor/Fuel System				Ignition System	EGR System	Induction System
Manufacturer	Disabled Limiter Caps	Maladjusted Idle Mixture	Maladjusted Idle Speed	Maladjusted Choke	Maladjusted Timing	Defective or Disabled EGR Valve	Disabled Hoses, Tubes and Wires
General Motors	31/102	28/102	19/102	13/101	19/102	0/102	1/102
Ford	36/99	15/99	24/99	6/99	20/99	1/99	6/99
Chrysler	69/99	70/99	31/99	11/99	18/99	9/97	5/99
Total	136/300	113/300	74/300	30/299	57/300	10/298	12/300

TABLE III-4 FREQUENCY OF COMBINATIONS OF DISABLED OR MALADJUSTED COMPONENTS OR SUBSYSTEMS FOR ALL VEHICLES

	Maladjusted Idle Mixture	Maladjusted Idle Speed	Maladjusted Choke	Maladjusted Timing	Disabled or Defective EGR Valve	Disabled Hoses, Tubes, Wires of Induction System	Total Frequency of Disabled or Maladjusted Component Taken by Itself
Disabled Limiter Caps	93/300	39/300	19/300	33/300	9/300	8/300	136/300
Maladjusted Idle Mixture	-	31/300	23/300	26/300	9/300	4/300	113/300
Maladjusted Idle Speed	-	-	7/300	18/300	2/300	5/300	74/300
Maladjusted Choke	-	-	-	10/300	1/300	1/300	30/300
Maladjusted Timing	-	-	-	-	3/300	1/300	57/300
Disabled or Defective EGR Valve	-	-	-	-	-	0/300	10/300
Disabled Hoses, Tubes, Wires of Induction Systems	-	-	-	-	-	-	12/300

TABLE III-5 PERCENT OF MALPERFORMANCE BY CITY GROUP
FOR EACH EMISSION SYSTEM FOR VEHICLES THAT PASSED THE INITIAL TEST

CITY	# CARS	EMISSION RELATED SYSTEM									AT LEAST ONE MAL-PERFORMANCE
		INDUCTION	CARBURETOR FUEL	IGNITION	EXHAUST GAS RECIRCULA-TION	AIR PUMP	POSITIVE CRANKCASE VENTILATION	EXHAUST	EVAPORA-TIVE	ENGINE ASSEMBLY & MISCELLA-NEOUS	
CHICAGO	44	6.82	43.18	11.36	2.27	0	0.00	0	0	0	47.73
DETROIT	49	10.20	42.86	16.33	6.12	0	2.04	0	0	0	57.14
WASHINGTON	32	0.00	34.38	9.38	3.13	0	0.00	0	0	0	43.75
TOTAL	125	6.40	40.80	12.80	4.00	0	0.80	0	0	0	50.40

TABLE III-6 PERCENT OF MALPERFORMANCE BY MANUFACTURER FOR ALL CITIES FOR EACH EMISSION SYSTEM FOR VEHICLES THAT PASSED THE INITIAL TEST

MANUFACTURER	# CARS	EMISSION RELATED SYSTEM									AT LEAST ONE MALPERFORMANCE
		INDUCTION	CARBURETOR FUEL	IGNITION	EXHAUST GAS RECIRCULATION	AIR PUMP	POSITIVE CRANKCASE VENTILATION	EXHAUST	EVAPORATIVE	ENGINE ASSEMBLY & MISCELLANEOUS	
GENERAL MOTORS	51	0.00	21.57	11.76	3.92	0	0.00	0	0	0	31.37
FORD	57	10.53	43.86	15.79	5.26	0	1.75	0	0	0	56.14
CHRYSLER	17	11.76	88.24	5.88	0.00	0	0.00	0	0	0	88.24
TOTAL	125	6.40	40.80	12.00	4.00	0	0.80	0	0	0	50.40

TABLE III-7 FREQUENCY OF DISABLED, MALADJUSTED, AND DEFECTIVE COMPONENTS OR SYSTEMS BY MANUFACTURER, FOR VEHICLES PASSING THE INITIAL TEST

	Carburetor/Fuel System				Ignition System	EGR System	Induction System
Manufacturer	Disabled Limiter Caps	Maladjusted Idle Mixture	Maladjusted Idle Speed	Maladjusted Choke	Maladjusted Timing	Defective or Disabled EGR Valve	Disabled Hoses, Tubes & Wires
GENERAL MOTORS	2/51	1/51	6/51	2/50	4/51	0/51	0/51
FORD	14/57	6/57	11/57	5/57	8/57	0/57	4/57
CHRYSLER	8/17	4/17	5/17	2/17	0/17	0/16	1/17
TOTAL	24/125	11/125	22/125	9/124	12/125	0/124	5/125

TABLE III-8 PERCENT OF MALPERFORMANCE

BY CITY GROUP FOR EACH EMISSION SYSTEM FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	EMISSION RELATED SYSTEM									AT LEAST ONE MAL-PERFORMANCE
		INDUCTION	CARBURETOR FUEL	IGNITION	EXHAUST GAS RECIRCULATION	AIR PUMP	POSITIVE CRANKCASE VENTILATION	EXHAUST	EVAPORATIVE	ENGINE ASSEMBLY & MISCELLANEOUS	
CHICAGO	56	8.9	78.6	26.8	26.8	0.0	1.8	0	3.6	0.0	89.3
DETROIT	51	3.9	88.2	33.3	17.6	3.9	0.0	0	3.9	5.9	94.1
WASHINGTON	68	5.9	85.3	45.6	25.0	0.0	0.0	0	0.0	0.0	91.2
TOTAL	175	6.3	84.0	36.0	23.4	1.1	0.6	0	2.3	1.7	91.4

TABLE III-9 PERCENT OF MALPERFORMANCE

BY MANUFACTURER FOR EACH EMISSION SYSTEM FOR VEHICLES FAILING THE INITIAL TEST

MANUFACTURER	# CARS	EMISSION RELATED SYSTEM									AT LEAST ONE MALPERFORMANCE
		INDUCTION	CARBURETOR FUEL	IGNITION	EXHAUST GAS RECIRCULATION	AIR PUMP	POSITIVE CRANKCASE VENTILATION	EXHAUST	EVAPORATIVE	ENGINE ASSEMBLY & MISCELLANEOUS	
GENERAL MOTORS	51	3.9	76.5	31.4	13.7	0.0	0.0	0	2.0	0.0	86.3
FORD	42	7.1	71.4	38.1	35.7	4.8	0.0	0	2.4	4.8	85.7
CHRYSLER	82	7.3	95.1	37.8	23.2	0.0	1.2	0	2.4	1.2	97.6
TOTAL	175	6.3	84.0	36.0	23.4	1.1	0.6	0	2.3	1.7	91.4

TABLE III-10 FREQUENCY OF DISABLED, MALADJUSTED, AND DEFECTIVE COMPONENTS OR SYSTEMS BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST

	Carburetor/Fuel System				Ignition System	EGR System			Induction System
Manufacturer	Disabled Limiter Caps	Mal-adjusted Idle Mixture	Mal-adjusted Idle Speed	Mal-adjusted Choke	Mal-adjusted Timing	Defective or Disabled EGR Valve	Defective EGR Transducer	Disabled EGR Hoses, Lines	Disabled Hoses, Lines, Wires
GENERAL MOTORS	29/51	27/51	13/51	11/51	15/51	0/51	1/3	7/51	1/51
FORD	22/42	9/42	13/42	1/42	12/42	1/42	9/30	4/42	2/42
CHRYSLER	61/82	66/82	26/82	9/82	18/82	9/81	0/0	9/82	4/82
TOTAL	112/175	102/175	52/175	21/175	45/175	10/174	10/33	20/175	7/175

TABLE III-11 PERCENT CORRELATION* BETWEEN EMISSION COMPONENT MALPERFORMANCES AND VEHICLES THAT PASSED AND FAILED INITIAL TEST, BY MANUFACTURER

	Carburetor/Fuel System				Ignition System	EGR System	Induction System
Manufacturer	Disabled Limiter Caps	Maladjusted Idle Mixture	Maladjusted Idle Speed	Maladjusted Choke	Maladjusted Timing	Defective or Disabled EGR Valve	Disabled Hoses, Tubes, Wires
GENERAL MOTORS	+53.0	+50.9	+13.7	+17.6	+21.6	0.0	-2.0
FORD	+27.8	+10.9	+11.6	-6.4	+14.6	-2.4	-2.2
CHRYSLER	+27.4	+57.0	+2.3	-0.8	+22.0	+11.1	-1.0
TOTAL	+44.8	+49.5	+11.1	+4.7	+16.1	+5.7	0.0
ANY MAL-PERFORMANCE	+43.2				+23.2	+19.4	-0.1

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[*] Difference between the malperformance rates of failed minus passed vehicles. A + sign denotes a positive correlation between a malperformance and a failed vehicle. A - sign denotes a negative correlation or a correlation between a malperformance and a passed vehicle. Zero represents no correlation between malperformance and passed or failed vehicles.

TABLE III-12 PERCENT OF MALPERFORMANCE BY CITY GROUP FOR EACH EMISSION SYSTEM FOR VEHICLES PROJECTED TO PASS THE AS-RECEIVED TEST AT 50,000 MILES

CITY	# CARS	EMISSION RELATED SYSTEM									AT LEAST ONE MAL-PERFORMANCE
		INDUCTION	CARBURETOR FUEL	IGNITION	EXHAUST GAS RECIRCULATION	AIR PUMP	POSITIVE CRANKCASE VENTILATION	EXHAUST	EVAPORATIVE	ENGINE ASSEMBLY & MISCELLANEOUS	
CHICAGO	33	9.09	39.39	6.06	0.00	0	0.00	0	0	0	39.39
DETROIT	42	9.52	40.48	19.05	4.76	0	2.38	0	0	0	57.14
WASHINGTON	27	0.00	33.33	3.70	3.70	0	0.00	0	0	0	37.04
TOTAL	102	6.86	38.24	10.78	2.94	0	0.98	0	0	0	46.08

TABLE III-13 PERCENT OF MALPERFORMANCE BY MANUFACTURER FOR EACH EMISSION SYSTEM FOR VEHICLES PROJECTED TO PASS THE AS-RECEIVED TEST AT 50,000 MILES

MANUFACTURER	# CARS	EMISSION RELATED SYSTEM									AT LEAST ONE MALPERFORMANCE
		INDUCTION	CARBURETOR FUEL	IGNITION	EXHAUST GAS RECIRCULATION	AIR PUMP	POSITIVE CRANKCASE VENTILATION	EXHAUST	EVAPORATIVE	ENGINE ASSEMBLY & MISCELLANEOUS	
GENERAL MOTORS	43	0.00	16.28	11.63	2.33	0	0.00	0	0	0	25.58
FORD	47	10.64	44.68	12.77	4.26	0	2.13	0	0	0	53.19
CHRYSLER	12	16.67	91.67	0.00	0.00	0	0.00	0	0	0	91.67
TOTAL	102	6.86	38.24	10.78	2.94	0	0.98	0	0	0	46.08

TABLE III-14 PERCENT OF MALPERFORMANCE FOR VEHICLES PROJECTED TO FAIL THE AS-RECEIVED TEST AT 50,000 MILES FOR EACH EMISSION SYSTEM BY CITY

CITY	# CARS	EMISSION RELATED SYSTEM									AT LEAST ONE MAL-PERFORMANCE
		INDUCTION	CARBURETOR FUEL	IGNITION	EXHAUST GAS RECIRCULA-TION	AIR PUMP	POSITIVE CRANKCASE VENTILATION	EXHAUST	EVAPORA-TIVE	ENGINE ASSEMBLY & MISCELLA-NEOUS	
CHICAGO	67	7.46	74.63	26.87	23.88	0.00	1.49	0	2.99	0.00	86.57
DETROIT	58	5.17	84.48	29.31	17.24	3.45	0.00	0	3.45	5.17	89.66
WASHINGTON	73	5.48	82.19	45.21	23.29	0.00	0.00	0	0.00	0.00	90.41
TOTAL	198	6.06	80.30	34.34	21.72	1.01	0.51	0	2.02	1.52	88.89

TABLE III-15 PERCENT OF MALPERFORMANCE FOR VEHICLES PROJECTED TO FAIL THE AS-RECEIVED TEST AT 50,000 MILES FOR EACH EMISSION SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	EMISSION RELATED SYSTEM									AT LEAST ONE MALPERFORMANCE
		INDUCTION	CARBURETOR FUEL	IGNITION	EXHAUST GAS RECIRCULATION	AIR PUMP	POSITIVE CRANKCASE VENTILATION	EXHAUST	EVAPORATIVE	ENGINE ASSEMBLY & MISCELLANEOUS	
GENERAL MOTORS	59	3.39	72.88	28.81	13.56	0.00	0.00	0	1.69	0.00	83.05
FORD	52	7.69	65.38	36.54	30.77	3.85	0.00	0	1.92	3.85	82.69
CHRYSLER	87	6.90	94.25	36.78	21.84	0.00	1.15	0	2.30	1.15	96.55
TOTAL	198	6.06	80.30	34.34	21.72	1.01	0.51	0	2.02	1.52	88.89

TABLE III-16 PERCENT CORRELATION* BETWEEN EMISSION COMPONENT MALPERFORMANCES AND VEHICLES PROJECTED TO PASS OR FAIL AN AS-RECEIVED TEST AT 50,000 MILES BY MANUFACTURER

	Carburetor/Fuel System				Ignition System	EGR System	Induction System
Manufacturer	Disabled Limiter Caps	Mal-adjusted Idle Mixture	Mal-adjusted Idle Speed	Mal-adjusted Choke	Mal-adjusted Timing	Defective or Disabled EGR Valve	Disabled Hoses, Tubes, Wires
GENERAL MOTORS	+48.5	+43.5	+16.1	+13.8	+16.1	0.0	+1.7
FORD	+28.7	+4.5	+9.6	-8.7	+18.2	+1.9	-0.6
CHRYSLER	+13.0	+61.5	-2.0	-6.4	+20.7	+2.1	-3.7
TOTAL	+42.0	+43.7	+12.1	+1.7	+16.4	+4.1	+0.1
ANY MAL-PERFORMANCE		+42.1			+23.5	+18.8	-0.8

*Difference between the malperformance rates of failed minus passed vehicles.
A + sign denotes a correlation between a malperformance and a failed vehicle.
A - sign denotes a correlation between a malperformance and a passed vehicle.
Zero represents no correlation between malperformance and passed or failed vehicles.

4.0 EFFECT OF ADJUSTMENTS OUTSIDE OF SPECIFICATION TOLERANCES FOR TIMING, IDLE RPM AND IDLE CO

The degree to which a vehicle subsystem or component is out of adjustment is as important as the frequency or rate of malperformance of that component. A particular component may have a high rate of maladjustment, but the degree to which it is maladjusted may have a very small effect on emissions. On the other hand, it is possible for a component to have a very small rate of malperformance, but the degree to which it malperforms may be large (i.e., it may be totally disabled) and the result may be a large increase of the level of emissions.

The most prevalent emission component or subsystem malperformances found on the RM test vehicles are high idle CO, maladjusted idle speed, and maladjusted timing. The analysis of this section examines these three types of malperformances and their effect on emission levels and FTP failure rates. It is emphasized that the effects of these malperformances as given in this section are not independent of one another (nor are the effects independent of other malperformances). For example, a vehicle with high idle CO may also have maladjusted idle speed and perhaps other malperformances.

New vehicles are tested and certified with their vehicle parameters, i.e., timing, at the mean of their allowable tolerance levels. That is, every vehicle is tested when certified at the manufacturer's specification for timing and idle RPM with tolerances of ±2° for timing and ±100 RPM for idle RPM. Prior testing programs conducted by EPA have indicated a correlation between excessive tailpipe idle CO rates and the failure of a vehicle to pass the standards. Since most vehicles do not have idle CO specifications, an idle CO value was selected to define the difference between adjusted and maladjusted idle CO. A value of 0.5% was selected for the idle CO specification, where values greater than 0.5% are considered outside of tolerances.

Investigations of the effect of maladjustments (adjustments outside of the allowed tolerances) on emissions are considered for the 300 vehicles for the initial test of the RM program. The effect of maladjustments on fuel economy (both the Federal Test Procedure, FTP, fuel economy and the Highway Fuel Economy Test, HFET) will be explored. The FTP fuel economy is representative of urban or city driving, and the HFET is representative of high speed, non-urban driving. Differences between cities and manufacturers are also explored.

4.1 PERCENTAGE OF VEHICLES WITHIN AND OUTSIDE OF SPECIFICATION TOLERANCES

Tables IV-1 and IV-2 show the percent of vehicles outside of the defined specifications for timing, tailpipe idle CO and idle RPM by city and manufacturer. For instance, 35% of all vehicles were outside of the defined specification tolerances for timing, 39% were greater than the idle CO specification of 0.5%, and 35% were outside of the defined specification tolerances for idle RPM. Seventy-two percent of all vehicles were outside of at least one of these specifications.

The largest differences between cities occur for timing with 24% of Chicago vehicles out of specification tolerances and 45% of Washington vehicles out of specification tolerances and for idle RPM with 27% of Chicago vehicles out of specification tolerances and 46% of Detroit vehicles out of specification tolerances. Chicago, thus, has the lowest percentage of vehicles outside of specification tolerances for timing and idle RPM. There are no city differences for idle CO.

There are no differences between manufacturers for timing. Chrysler has the largest percent of vehicles outside of the specification tolerances for idle CO with 76% and for idle RPM with 46%. Ninety-three percent of all Chrysler vehicles are outside of at least one specification as compared with 64% for Ford and 61% for General Motors.

4.2 CORRELATION BETWEEN VEHICLES WITHIN OR OUTSIDE OF SPECIFICATION TOLERANCES AND THE FAILURE OF A VEHICLE TO PASS THE FTP

The purpose of this section is to determine if there is a correlation between vehicles outside of specification tolerances for idle CO, timing and/or idle RPM and vehicles failing the emissions standards. It has been shown in Section 3 that 175 of the 300 vehicles in test 1 fail one or more of the emissions standards for HC, CO, and NOX. If we assume that the emissions are normally distributed (this will be discussed in more detail in the next section), then the distribution for all 300 vehicles taking test 1 might be as postulated in Figure 4-1 for any of the three emissions.

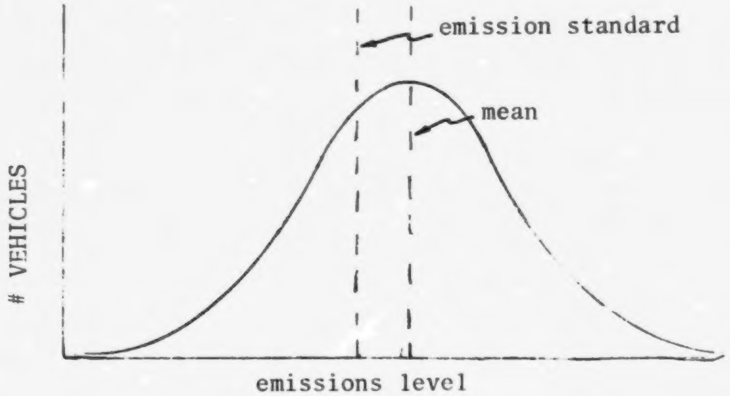


Figure 4-1 HYPOTHETICAL DISTRIBUTION OF EMISSIONS ASSUMING NORMAL DISTRIBUTION FOR 300 VEHICLES IN TEST 1

Figure 4-1 is only a qualitative example of an assumed normal distribution whose mean is greater than a standard. If the distribution of vehicles in Figure 4-1 was partitioned into two distributions, those vehicles within specification tolerances, and those vehicles outside of specification tolerances for a particular component (i.e., timing), then each distribution (also assuming each is normally distributed) might be as portrayed in Figure 4-2.

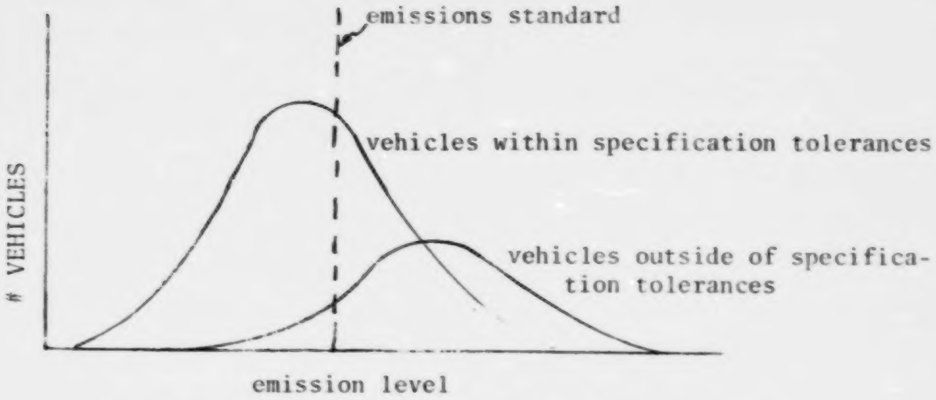


Figure 4-2 HYPOTHETICAL DISTRIBUTION OF EMISSIONS FOR VEHICLES WITHIN AND OUTSIDE OF SPECIFICATIONS

Quite clearly, if the distribution of vehicles represented in Figure 4-1 is normally distributed, then the partitioned distribution represented in Figure 4-2 cannot also both be normally distributed. However, Figure 4-2 does demonstrate qualitatively the distribution obtained when the emissions from the 300 vehicles are partitioned into vehicles within and vehicles outside of specifications. In fact, the means for the HC and CO FTP emissions and bag values are always larger for the vehicles outside of specifications than for vehicles within specifications, although the differences in the means between within and outside of specifications is not always statistically significant. Table IV-3 presents those FTP emissions and bag values whose differences in means between within and outside of tolerances are statistically significant at the 0.05 level for each component (timing, idle RPM and idle CO) by manufacturer. The group defined as "At Least One" is that group with vehicles that have at least one of the three items (timing, idle RPM, and/or idle CO) within tolerances or outside of tolerances. "At Least One" for vehicles within specifications would be that group of vehicles within all three specifications for timing, idle RPM and idle CO simultaneously.

Table IV-3 indicates that the differences between means of the within and outside of specifications groups are significant primarily for idle CO for hydrocarbons and carbon monoxide. In the few places where the differences are significant for nitrous oxides, the means for vehicles within specifications are greater than the means for vehicles outside of specifications at the 0.05 level of significance.

If all the vehicles outside of a specification tolerance (i.e., idle CO) failed the FTP standards, and if all the vehicles within a specification tolerance passed the FTP standards, then all the vehicles less than the standard (passing the standard) in Figure 4-1 would be within specification tolerances and all vehicles greater than the standard (failing the standard) would all be outside of specification tolerances. For this case, there would be a positive correlation between vehicles outside of specification tolerances and vehicles failing the FTP standards.

Next consider the situation where all the vehicles outside of specification tolerances also fail the FTP standards but the vehicles within specification tolerances also fail the FTP standards for most vehicles. The situation would be such that all of the vehicles outside of specifications would be greater than the standard (fail the standard) and most of the vehicles within specifications would also be greater than the standard. Thus no correlation could be said to exist between vehicles outside of tolerances and vehicles failing the standard since most vehicles within specifications also fail the standards.

The percent of vehicles failing the FTP standards for vehicles outside of tolerances minus the percent of vehicles failing the FTP standards for vehicles within specification tolerances would be one statistic that would classify the degree of correlation. The closer this situation is to 100%, the greater the degree of correlation between vehicles outside of specification and vehicles failing the FTP standards. Also, by definition, the closer this statistic is to 100%, the greater the degree of correlation between vehicles within specifications and vehicles passing the FTP standards. If the statistic is zero, there is no correlation. If there are no statistically significant differences in the means between vehicles within and vehicles outside of specifications, then the statistic is apt to be zero and no correlation will exist.

Tables IV-4 through IV-7 show the percent of vehicles failing each standard and at least one standard for vehicles within and outside of specification tolerances. The category "At Least One" for vehicles within specification tolerances delineates those vehicles within specifications for all specifications of timing, idle CO, and idle RPM simultaneously. There are a total of 83 vehicles in this group and 36% or 30 vehicles fail at least one of the FTP standards. Eleven of 40 General Motors vehicles within all three specification groups fail the FTP, 15 of 36 Ford vehicles within all specification groups fail the FTP, and 4 of 7 Chrysler vehicles within all three specification groups fail the FTP. The group of vehicles within all the specification groups simultaneously is an important one. Since 36% of these vehicles fail the FTP, the other component malperformances listed in Section 3 account for a number of the vehicles that fail to meet standards. But even after all emission components and subsystems have been adjusted and/or repaired, about 19% of the vehicles still fail standards. These 19% will be discussed further in Section 5.

The remaining discussion will investigate each specification group individually. Note, however, that these groups are not independent from one another (nor are these malperformances independent from EGR, air pump, etc. malperformances), and some linear combination of timing, idle RPM and idle CO values might be a better discriminator to determine whether a vehicle will pass or fail the FTP standards than any individual specification group.

Tables IV-4 through IV-7 show that idle CO is the best indicator of a pass or fail of the FTP standards. The correlation statistic previously defined is 52% for idle CO for all vehicles. The correlation statistic is 64% for General Motors, 21% for Ford, and 43% for Chrysler for idle CO. Whereas the overall correlation is best for idle CO as compared to idle RPM and timing, idle CO is a much better discriminator for General Motors vehicles than for Ford or Chrysler.

Idle CO is an even better indicator of a pass or fail of the HC and CO standards. The correlation statistic for all vehicles failing the HC standard is 62%, 71% for General Motors, 20% for Ford, and 61% for Chrysler.

The correlation statistic for all vehicles failing the CO standard is 76%, 90% for General Motors, 44% for Ford, and 74% for Chrysler. There is a very low or negative correlation statistic for NOX.

Figures 4-3 through 4-8 substantiate the previous correlation statistics and lend support to the hypothesized distributions of within and outside of specification groups in Figure 4-2. Figures 4-3 through 4-8 plot the vehicle number by emissions levels for HC, CO and NOX for vehicles with tailpipe idle CO less than or equal to .5% and vehicles with tailpipe idle CO greater than .5%. Most all of the vehicles with idle CO less than/equal to .5% pass the HC and CO emissions standards which is indicated by the vertical dashed line in each plot. A smaller but significant number of vehicles with tailpipe idle CO greater than .5% fail the HC and CO standards. Examination of the vehicles with low idle CO for NOX shows almost an equivalent number of vehicles failing the NOX standard as the number of vehicles failing the NOX standard for vehicles with the high idle CO values.

4.3 DEGREE TO WHICH IDLE CO, IDLE RPM, AND TIMING MALADJUSTMENTS EFFECT EMISSIONS AND FUEL ECONOMY

Discussions in this section are divided into two parts: first, the effect of the degree of idle CO, idle RPM, and timing maladjustments on emissions, and, second, the effect of the degree of these maladjustments on fuel economy. The results of Section 4.2 have demonstrated that there is a high degree of correlation between GM and Chrysler vehicles that have idle CO greater than .5% and GM and Chrysler vehicles that fail the HC and CO standards. Because of the results of Section 4.2, discussions in this section will focus primarily on the idle CO specification tolerances. The idle RPM and timing specification tolerances will be discussed but to a lesser degree.

Tables IV-8 through IV-10 show that the magnitude of the mean emissions increases as the positive deviation from idle CO of .5% increases. Caution is advised in interpreting these tables since the mean emissions of the vehicles in the groups with idle CO -1 to -2 deviations from 0.5% (or means of all vehicles with tailpipe idle CO between 0 and 0.25%) is derived

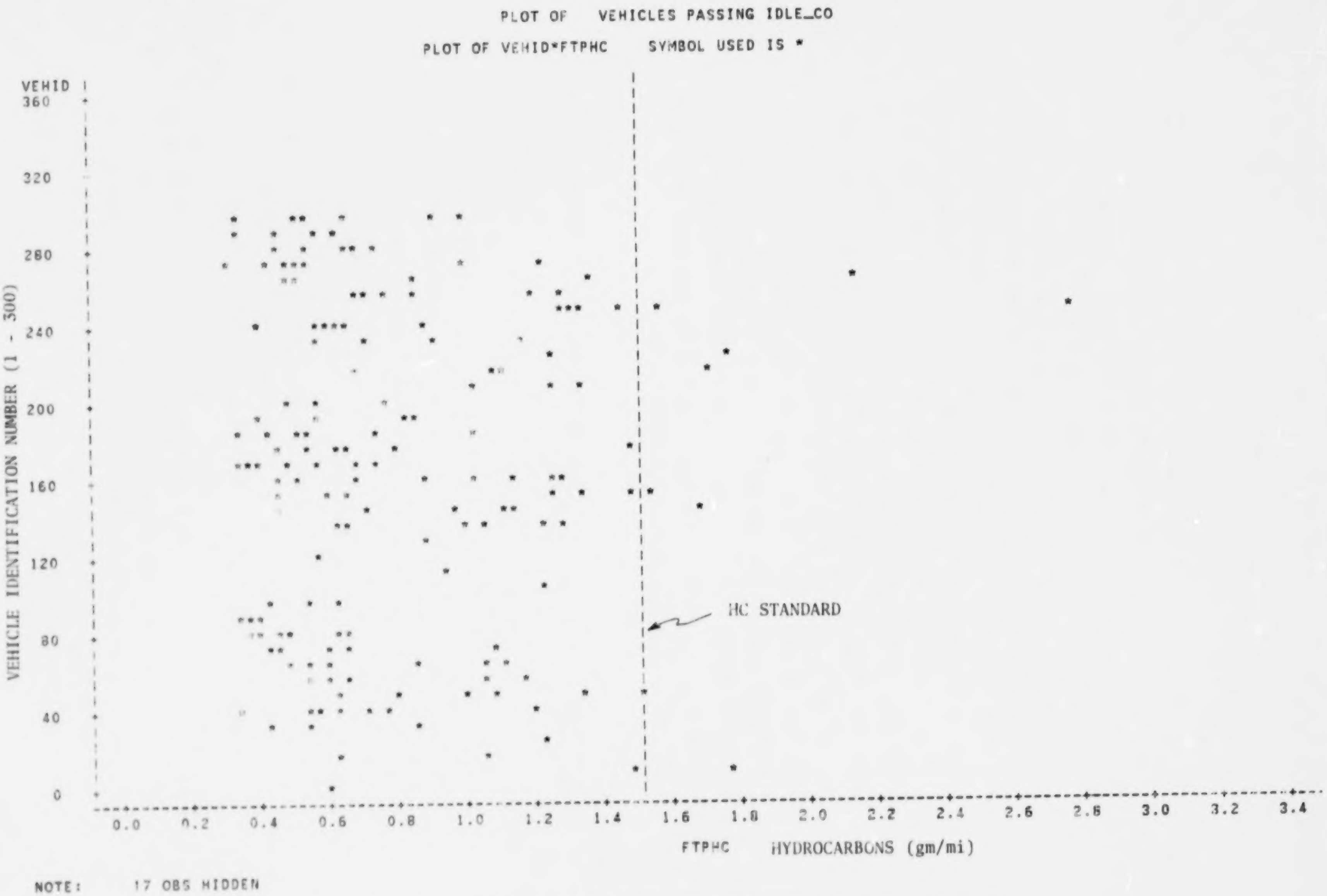
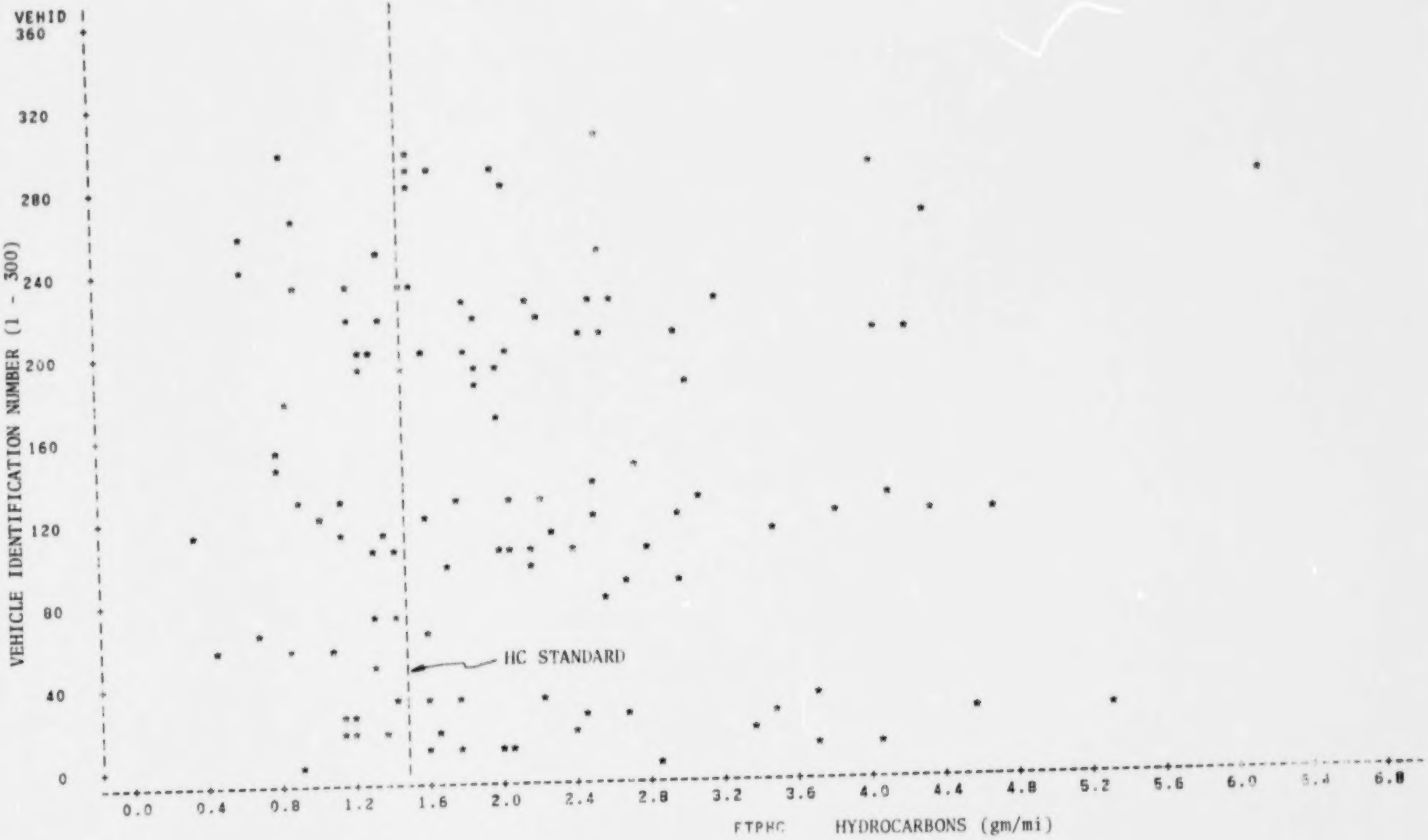


Figure 4-3 VEHICLES WITHIN IDLE CO SPECIFICATION FOR HC

PLOT OF VEHICLES FAILING IDLE_CO

PLOT OF VEHID*FTPHC SYMBOL USED IS *

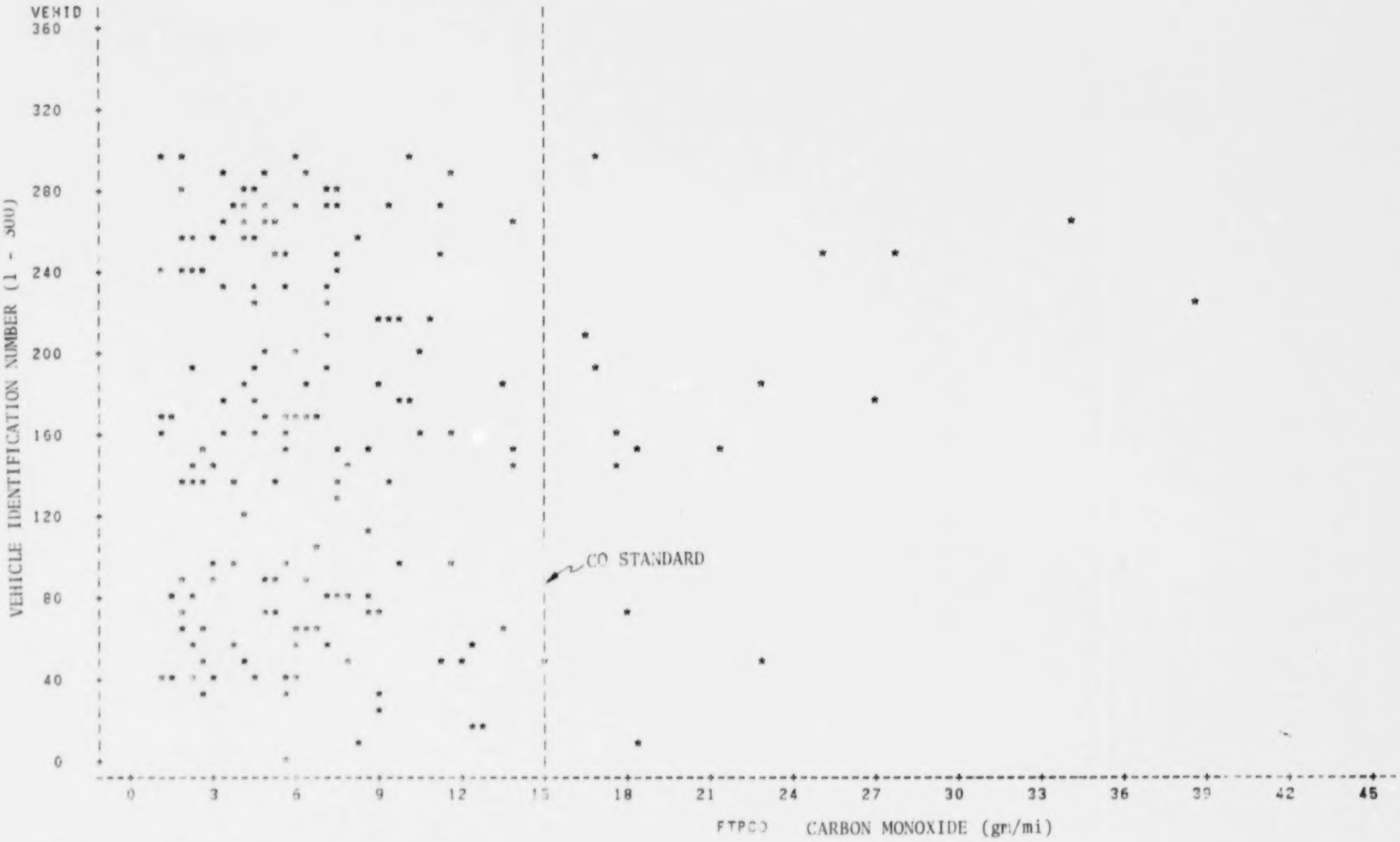


NOTE: 2 OBS HIDDEN

Figure 4-4 VEHICLES OUTSIDE OF THE IDLE CO SPECIFICATION FOR HC EMISSIONS

PLOT OF VEHICLES PASSING IDLE_CO

PLOT OF VEHID*FTPCO SYMBOL USED IS *

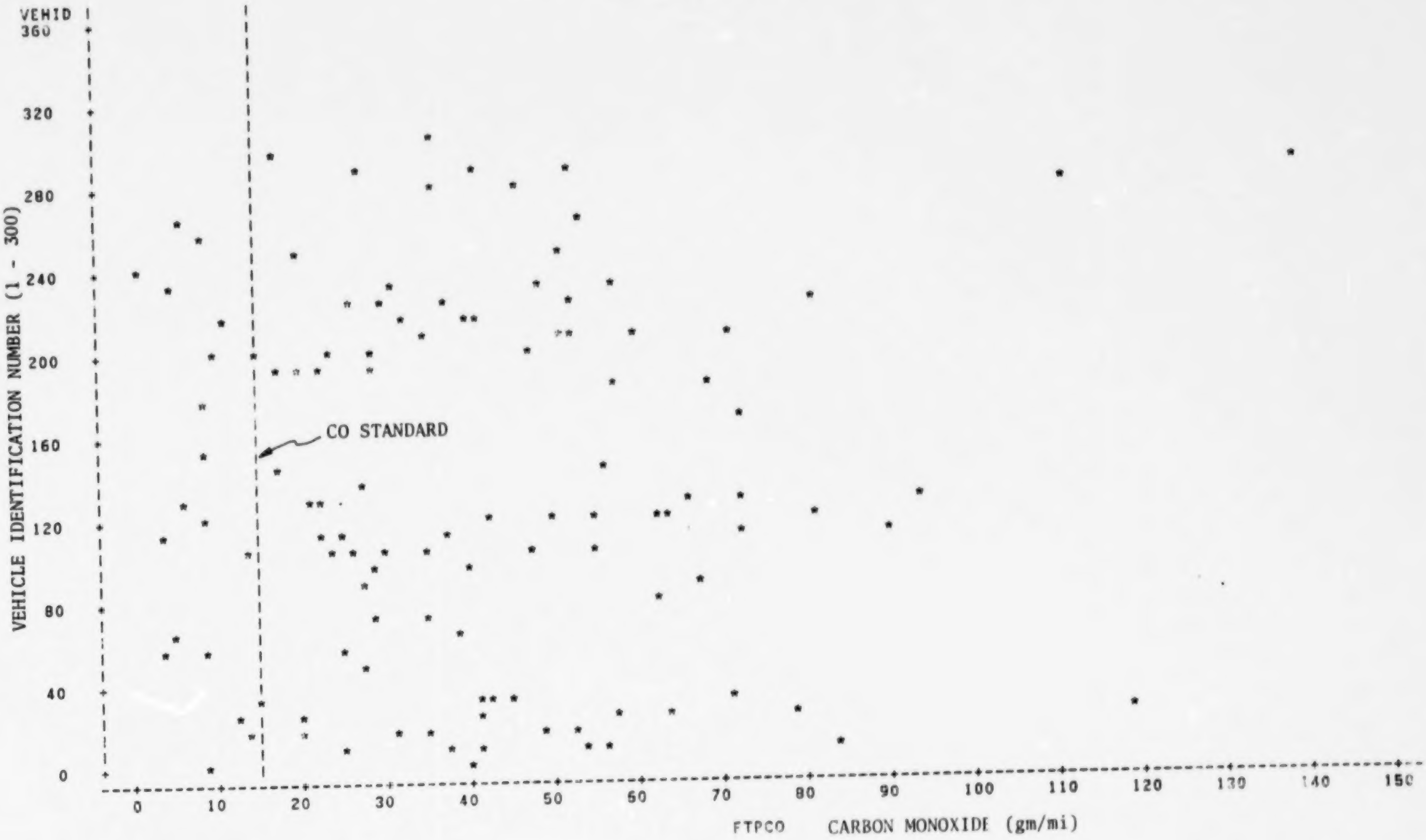


NOTE: 14 OBS HIDDEN

Figure 4-5 VEHICLES WITHIN THE IDLE CO SPECIFICATION FOR CO EMISSIONS

PLOT OF VEHICLES FAILING IDLE_CO

PLOT OF VEHID*FTPCO SYMBOL USED IS *

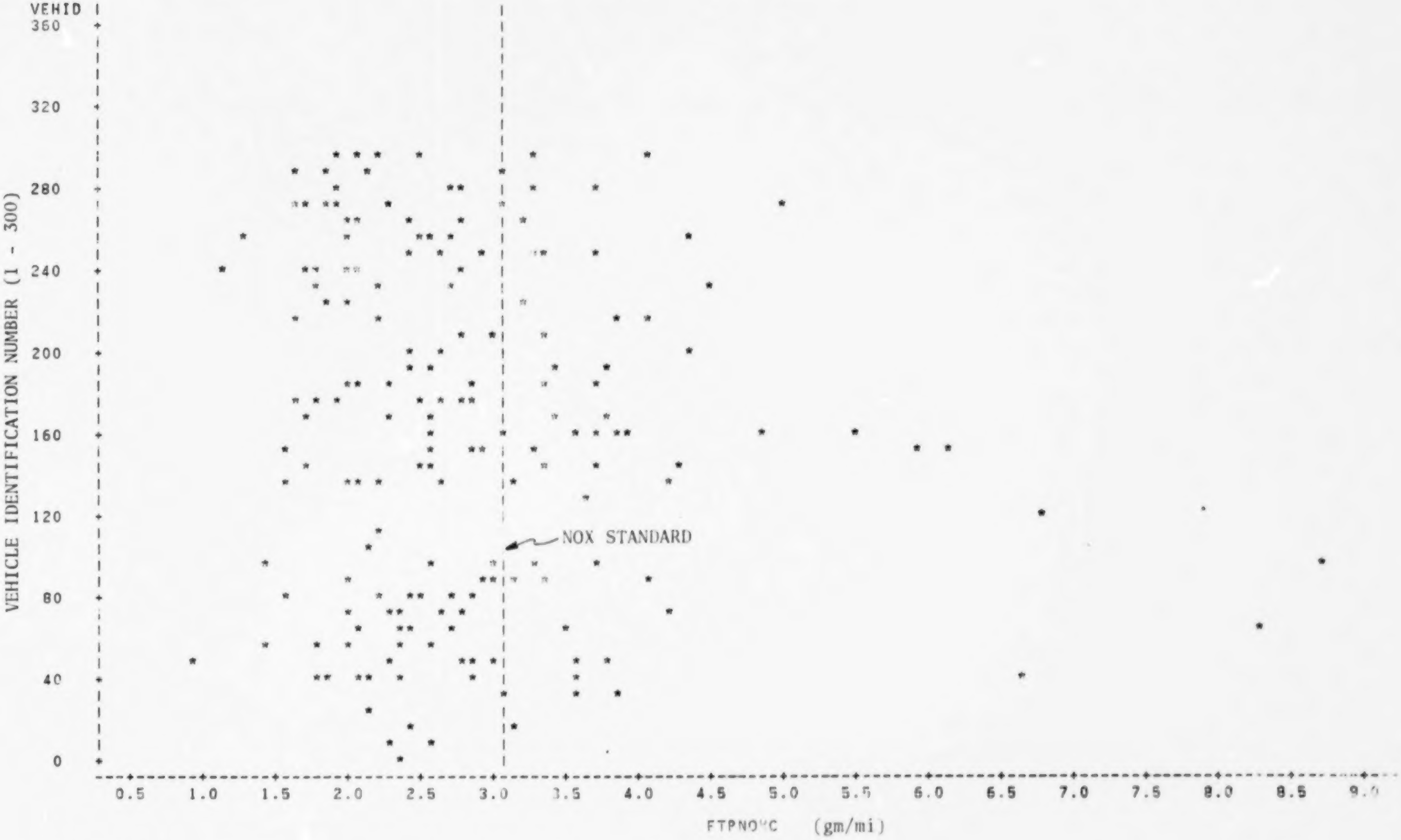


NOTE: 3 OBS HIDDEN

Figure 4-6 VEHICLES OUTSIDE OF THE IDLE CO SPECIFICATION FOR CO

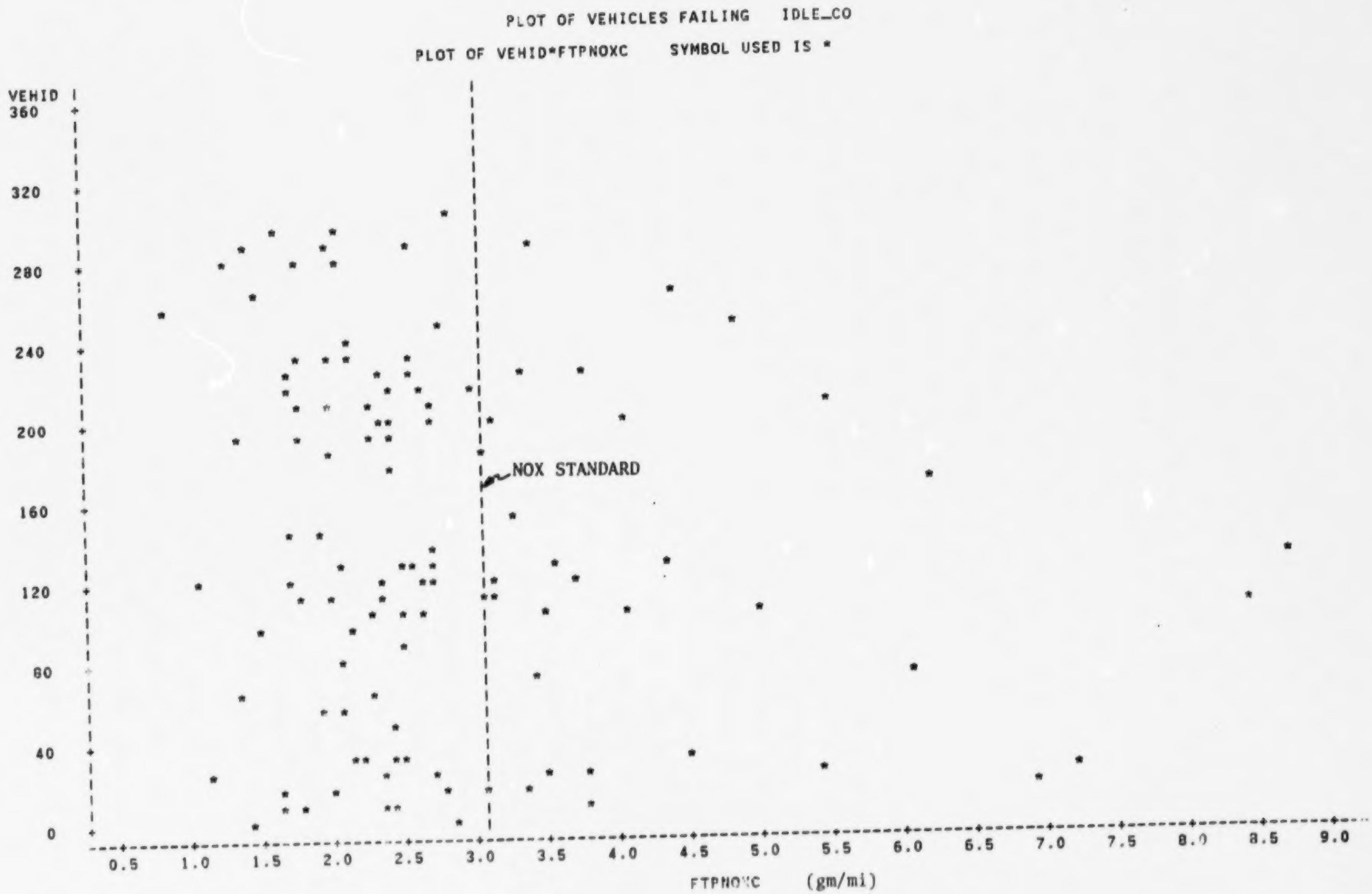
PLOT OF VEHICLES PASSING IDLE_CO

PLOT OF VEHID*FTPNOXC SYMBOL USED IS *



NOTE: 7 OBS HIDDEN

Figure 4-7 VEHICLES WITHIN THE IDLE CO SPECIFICATION FOR NOX



NOTE: 5 OBS HIDDEN

Figure 4-8 VEHICLES OUTSIDE OF THE IDLE CO SPECIFICATION FOR NOX

from 164 vehicles and mean emissions at positive deviations from .5% idle CO are derived from populations of between 1 and 10 vehicles. The group of vehicles in the deviation categories between 0 and +20 are vehicles with idle CO greater than .5% and the vehicles with deviation between 0 and -2 represent vehicles with idle CO less than .5%. The number of vehicles with idle CO less than .5% is large compared to the entire population of vehicles and is concentrated in a very narrow range of deviation, -2 to 0, while the number of vehicles with idle CO greater than .5% is comparatively small and is almost uniformly distributed over a wide range of deviations, 0 to +20. A histogram of the distribution of vehicles over the deviations from .5% idle CO is presented in Figure 4-9 for all vehicles. The distribution of vehicles over the deviations from .5% idle CO for General Motors, Chrysler and Ford vehicles varies somewhat from the histogram in Figure 4-9. Figure 4-10 shows the histogram of the vehicle distribution for Chrysler vehicles where the number of vehicles with idle CO less than or equal to .5% is almost equivalent to the number of vehicles between 6 and 11 deviations (idle CO between 1.5 and 2.75%) from .5%. In other words, the distribution of vehicles in Figure 4-10 (see Table IV-9) may be divided into two separate distributions, the vehicles with idle CO less than .5% (of which there are 24) and the vehicles between 6 and 11 deviations from .5% (of which there are 24). Figure 4-11 shows the histogram of the vehicle distribution for Ford vehicles. There are 84 of the 99 Ford vehicles with idle CO less than .5% and the remaining Ford vehicles are randomly scattered from 0 to +20 deviations from .5%. Examination of Table IV-10 shows that, as for Ford vehicles, a large number (74 of 102 GM vehicles) have idle CO less than .5%, and the remaining GM vehicles are grouped in a small number spread mostly between 6 and 11 deviations from .5% idle CO. The GM histogram is not presented since it is similar to the Ford and Chrysler histograms.

Figure 4-12 plots the emissions at each deviation from the .5% idle CO versus FTP HC and CO and may be considered as the deterioration of HC and CO as the deviation from the .5% idle CO increases. Deterioration of emissions as used previously and in the remainder of this report is generally considered to mean the degree by which the vehicle's emissions change as the engine and

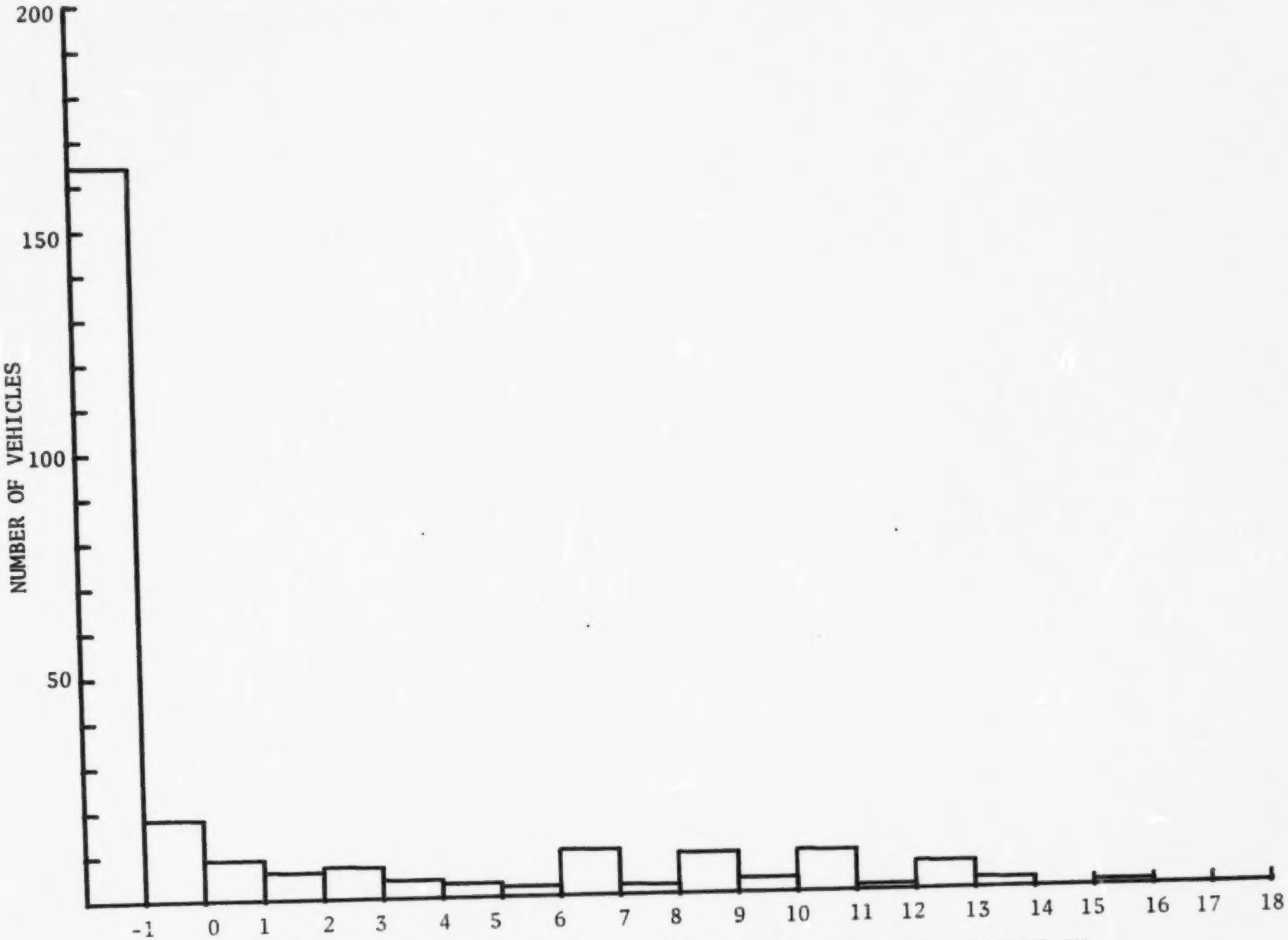


FIGURE 4-9 DEVIATION FROM .5% TAILPIPE IDLE CO FOR ALL VEHICLES IN AS-RECEIVED CONDITION (ONE DEVIATION EQUALS 0.25%)

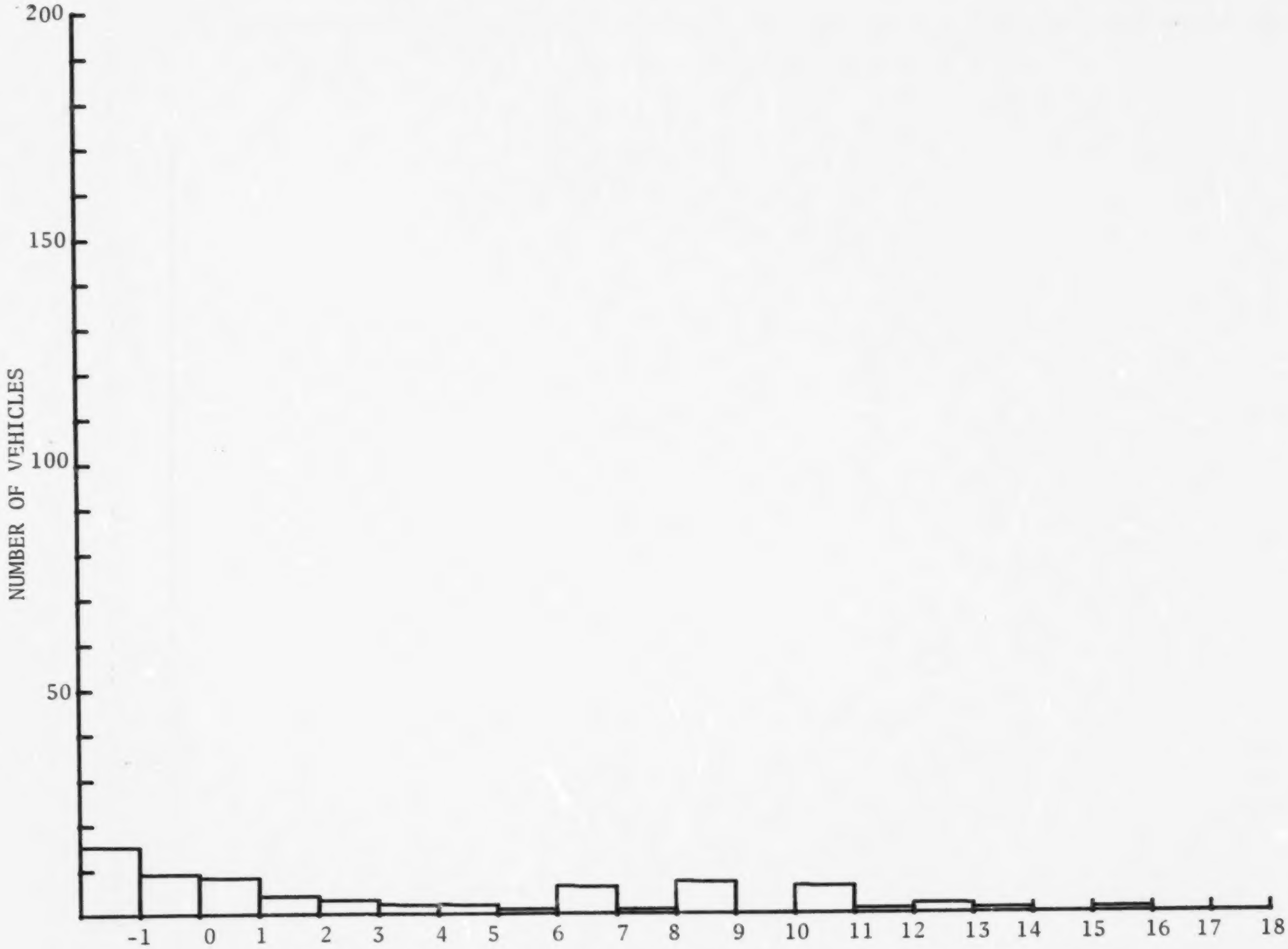


FIGURE 4-10 DEVIATION FROM .5% TAILPIPE IDLE CO FOR CHRYSLER VEHICLES IN AS-RECEIVED CONDITION (ONE DEVIATION EQUALS 0.25%)

(The Y scale is kept at the same scale as Fig. 4-9 for comparison.)

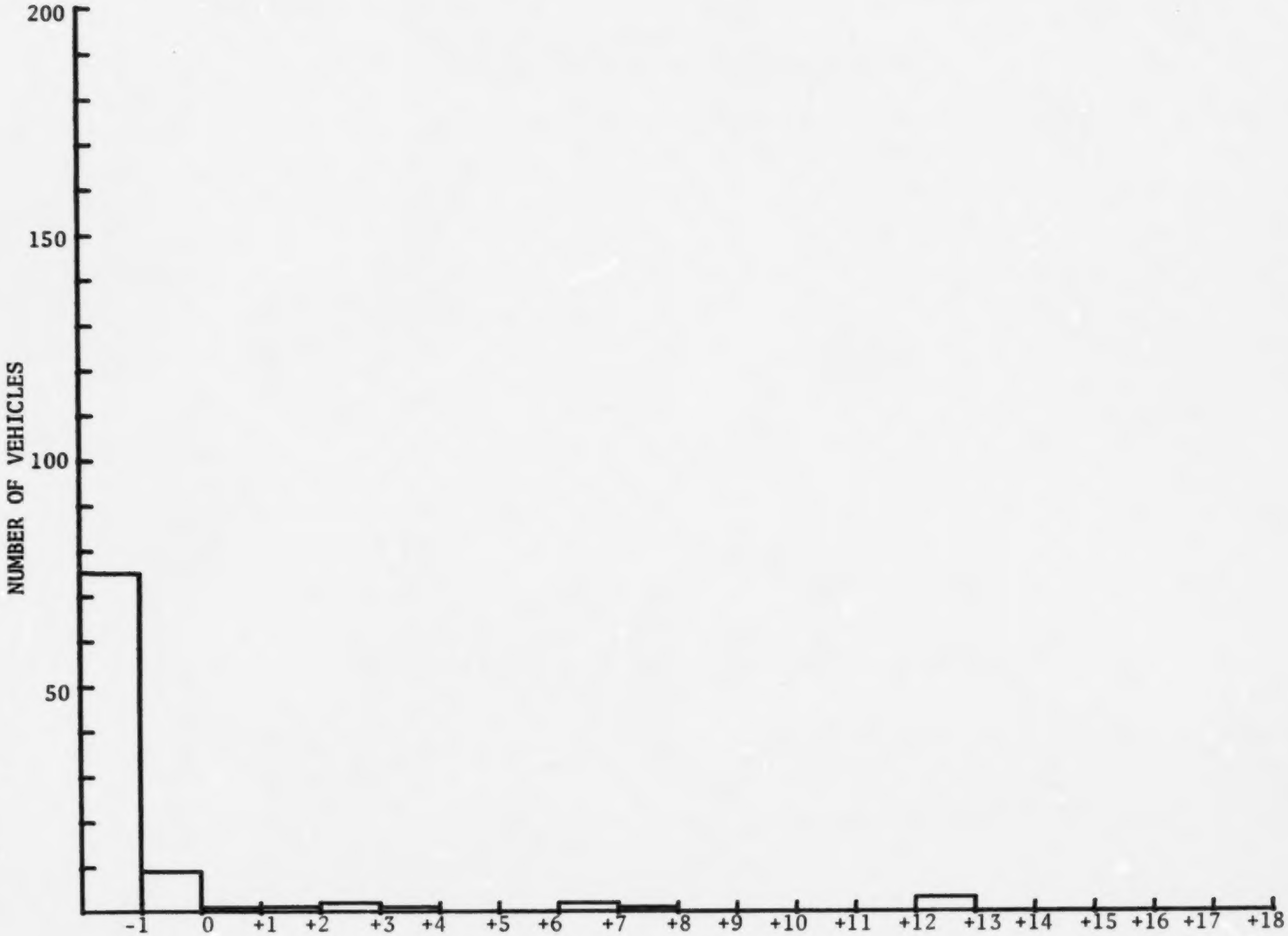


FIGURE 4-11 DEVIATION FROM .5% TAILPIPE IDLE CO FOR FORD VEHICLES IN AS-RECEIVED CONDITION (ONE DEVIATION EQUALS 0.25%)

(The Y scale is kept at the same scale as Fig. 4-9 for comparison.)

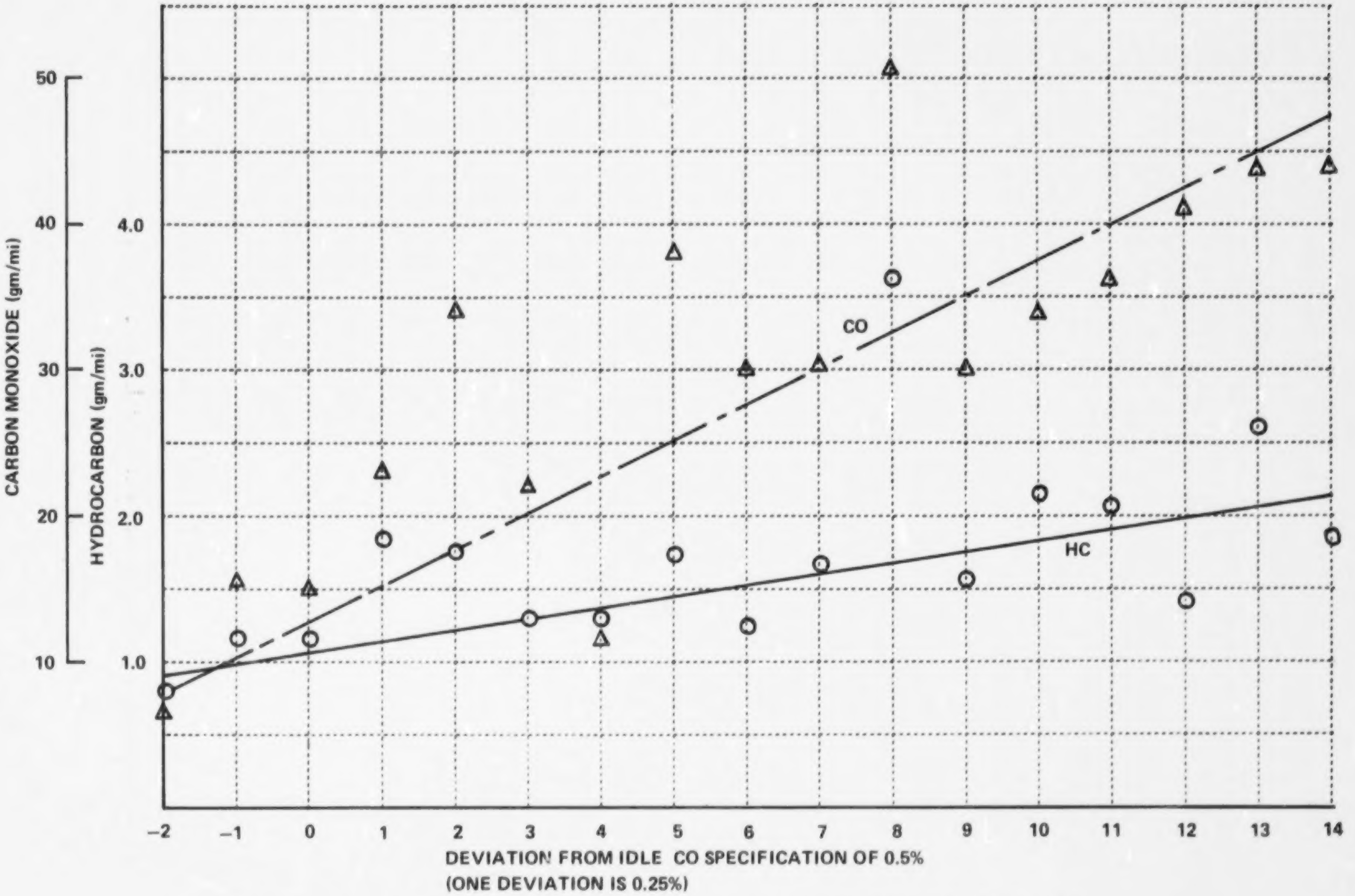


Figure 4-12 DETERIORATION OF HC AND CO AS A FUNCTION OF DEVIATION FROM THE IDLE CO SPECIFICATION FOR ALL VEHICLES

all associated control equipment collectively depreciate with time and mileage. However, for Figure 4-12 (and only for Figure 4-12) the term deterioration is applied for the idle CO measurement while neglecting any other malperforming engine component. Figure 4-12 represents graphically that HC and CO emissions increase as the deviation from the .5% idle CO increases.

Tables IV-11 and IV-12 present mean emissions and fuel economy at each deviation from specification for idle RPM and timing, respectively. Note that for each specification, the distribution of all vehicles is almost normally distributed about the specification as may be seen in Figures 4-13 and 4-14. Figure 4-15 shows the distribution of GM vehicles about the timing specification.

The question arises as to why the idle CO measurement appears to be a better indicator than idle RPM or timing of whether a vehicle will pass or fail the FTP emissions standards. One answer is evident from Table IV-8 and Figure 4-12 for idle CO. The table and figure show that HC and CO emissions increase in what appears to be a linear relationship to the increase in deviation from the .5% idle CO. Tables IV-11 and IV-12, however, indicate no such straightforward relationship between increasing emissions and increasing deviation from the idle RPM or timing specification.

It is appropriate to again mention that the .5% idle CO level is not a manufacturer's specification but by engineering judgments is assumed to be an appropriate cutpoint for defining high idle CO emissions for vehicles from all manufacturers. Also, the idle CO parameter is a single value (0.5%) whereas the idle RPM and timing specifications are double valued specifications (i.e., the idle RPM spec ±100 RPM and the timing spec ±2°). The result is that a vehicle may be considered maladjusted for idle CO only if it has greater than .5% idle CO, but the same vehicle may have maladjusted idle RPM and timing if it is greater than or less than the tolerance limits specified.

Before discussing the effect of the deviation from the specifications on fuel economy, Figure 4-16 is presented to demonstrate the dependence of fuel economy on cubic inch displacement for all vehicles on the as-received test.

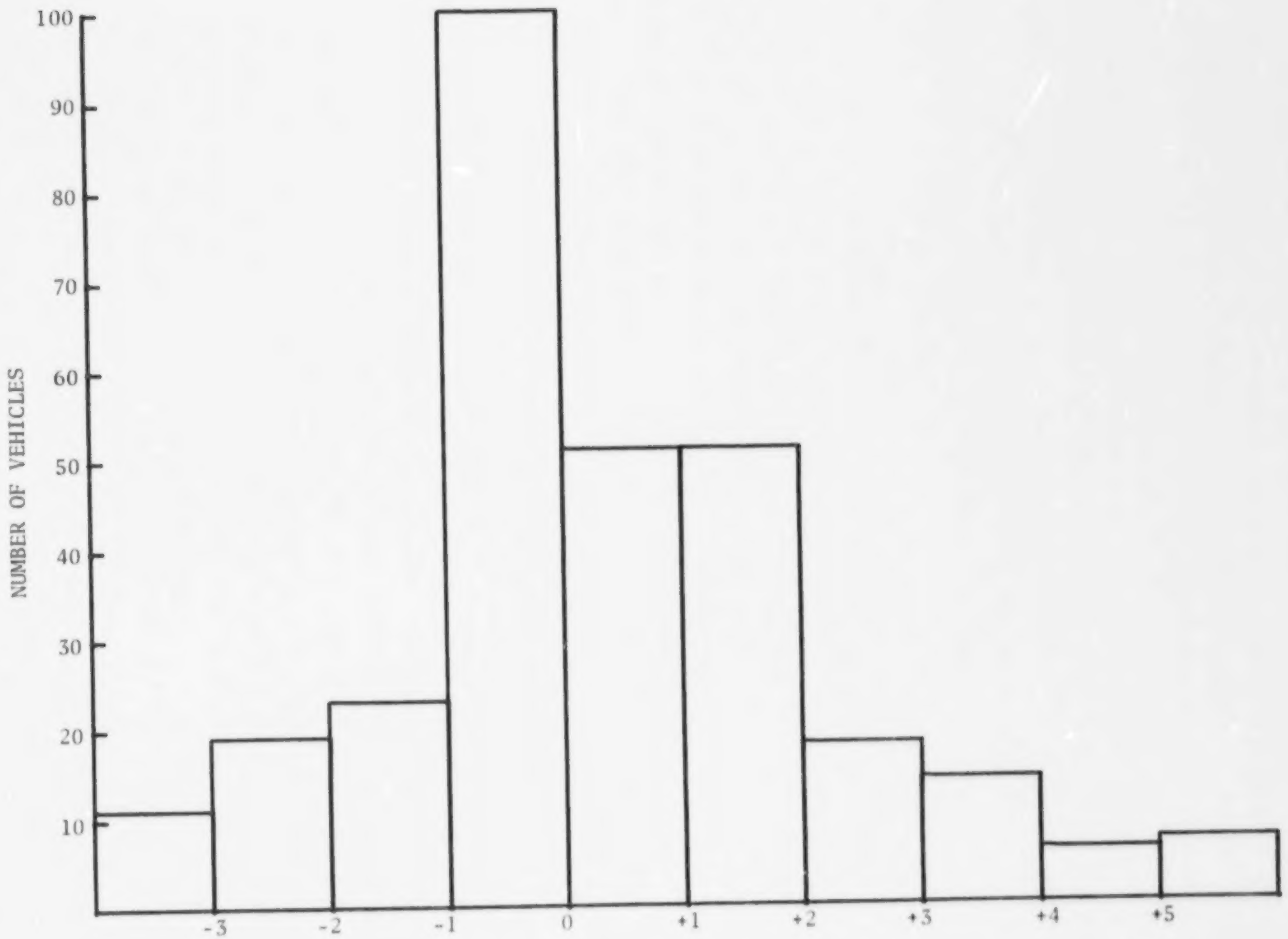


FIGURE 4-13 DEVIATION FROM THE IDLE RPM SPECIFICATION FOR ALL VEHICLES IN AS-RECEIVED CONDITION (ONE DEVIATION EQUALS 50 RPM)

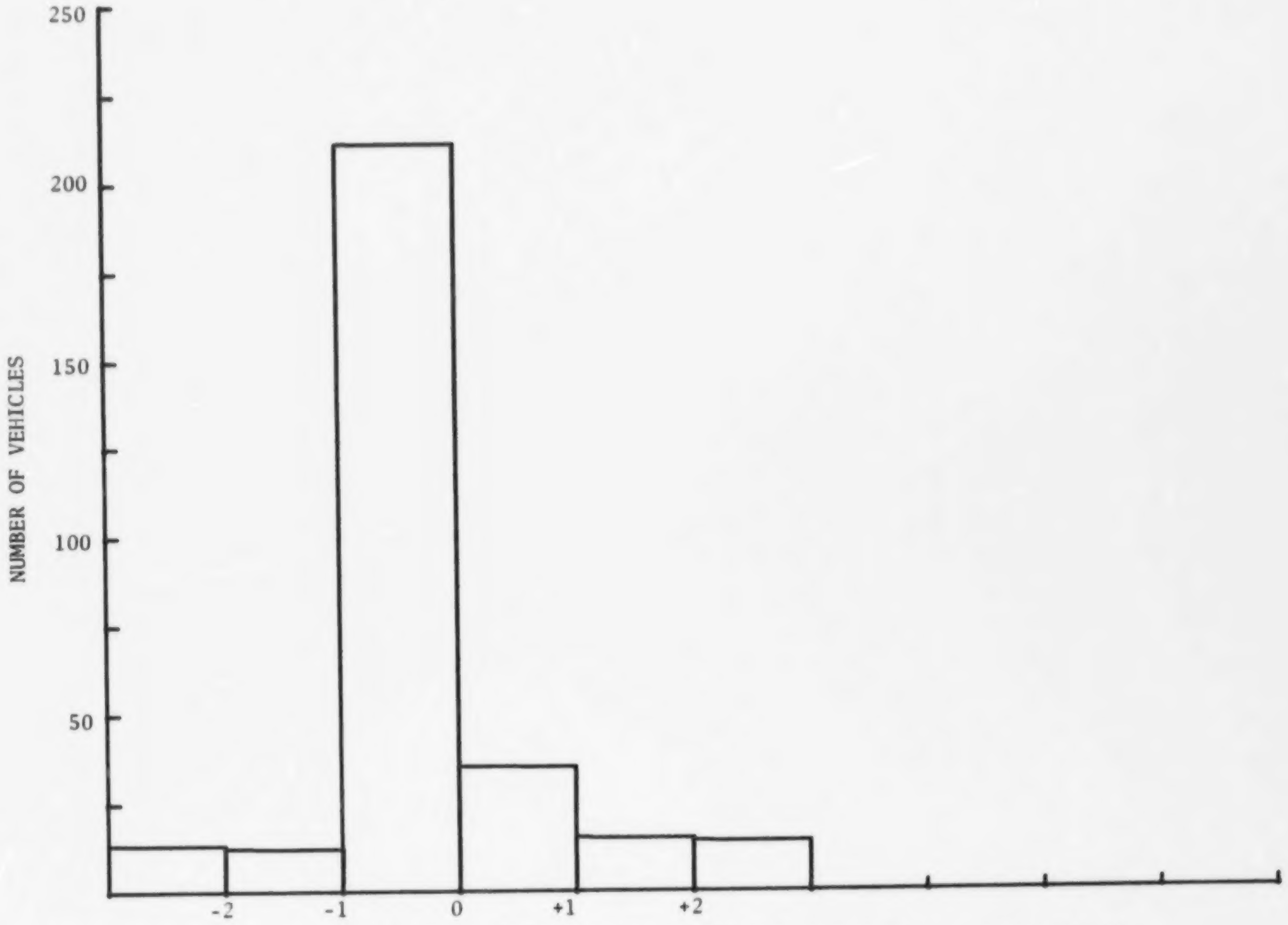


FIGURE 4-14 DEVIATION FROM THE TIMING SPECIFICATION FOR ALL VEHICLES IN AS-RECEIVED CONDITION (ONE DEVIATION EQUALS 2 DEGREES)

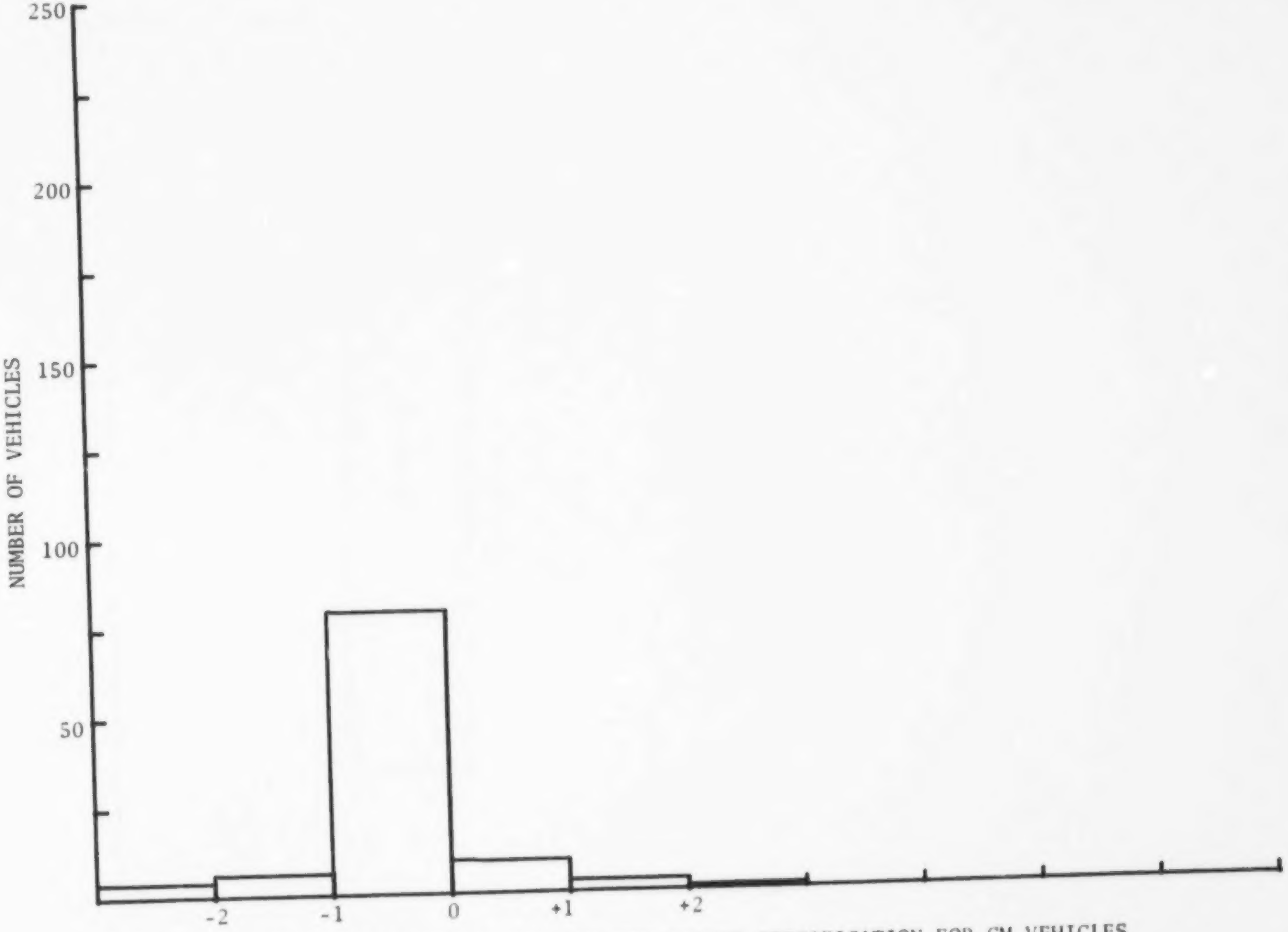
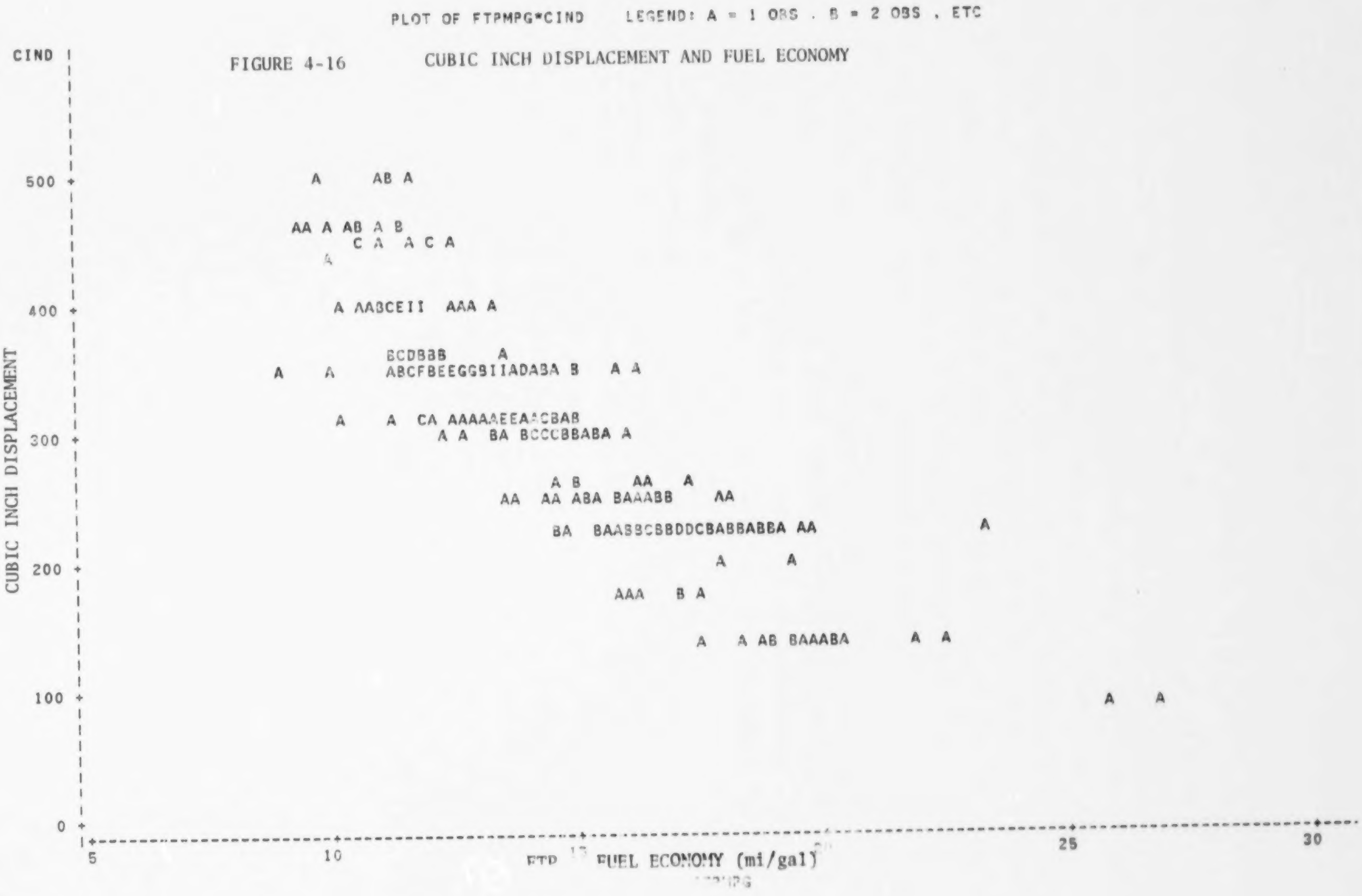


FIGURE 4-15 DEVIATION FROM THE TIMING SPECIFICATION FOR GM VEHICLES IN AS-RECEIVED CONDITION (ONE DEVIATION EQUALS 2 DEGREES)

Figure 4-16 is an important figure and any interpretation of the effects on fuel economy should be interpreted in light of this figure. Figures 4-17 through 4-19, therefore, interpreted along with Figure 4-16, show that most Ford and General Motors vehicles in the RM program are equipped with 350 or 351 cubic inch displacement engines, whereas vehicles in the Chrysler population are dominated by vehicles of 225 cubic inch displacement. Fuel economies as shown in previous EPA reports[3] are harmonically distributed and tests of significance between the means of fuel economy of two groups are tested using the chi-square distribution with one degree of freedom.

Examination of Tables IV-13 through IV-17 shows no consistent trend in fuel economy as a function of deviation from .5% idle CO for all vehicles combined, for General Motors, for Ford, and for Chrysler vehicles. Table IV-17 presents mean fuel economy by deviation from the timing specifications for GM vehicles. Table IV-17 is presented in particular because of the differences indicated in Table IV-3 in mean fuel economy between GM vehicles within and outside of specifications for timing was statistically significant at the 0.05 level. Fuel economy trends may be obscured in this table because of differences in the vehicle mix of the deviation categories. However, even if the difference in means is statistically significant for fuel economy, the result could be meaningless if the mean fuel economy of one group was composed of fuel economies of vehicles of a high cubic inch displacement and the mean fuel economy of the other group was composed of fuel economies of vehicles of a low cubic inch displacement.

FIGURE 4-16 CUBIC INCH DISPLACEMENT AND FUEL ECONOMY



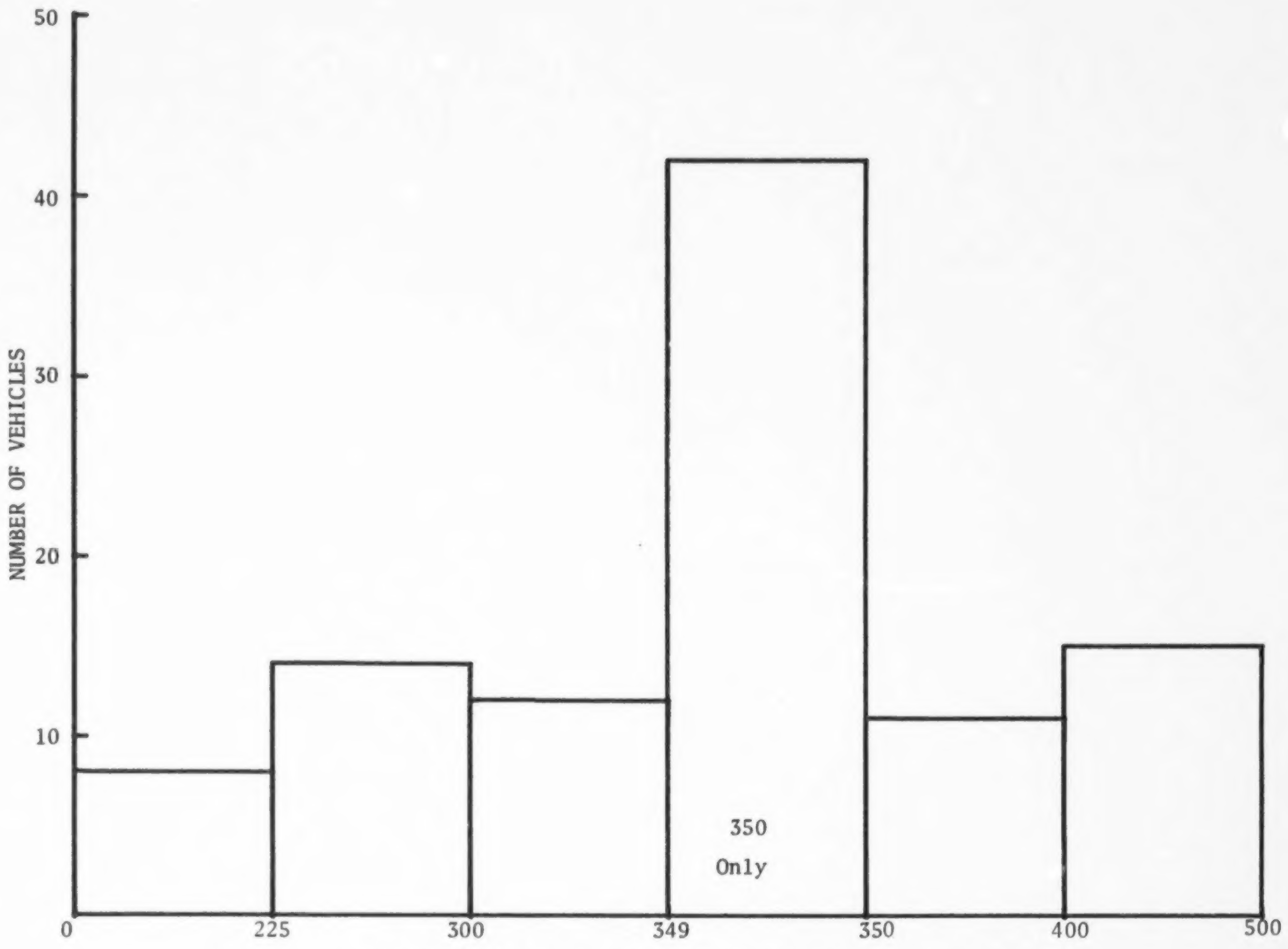


FIGURE 4-17 CUBIC INCH DISPLACEMENT FOR GM VEHICLES

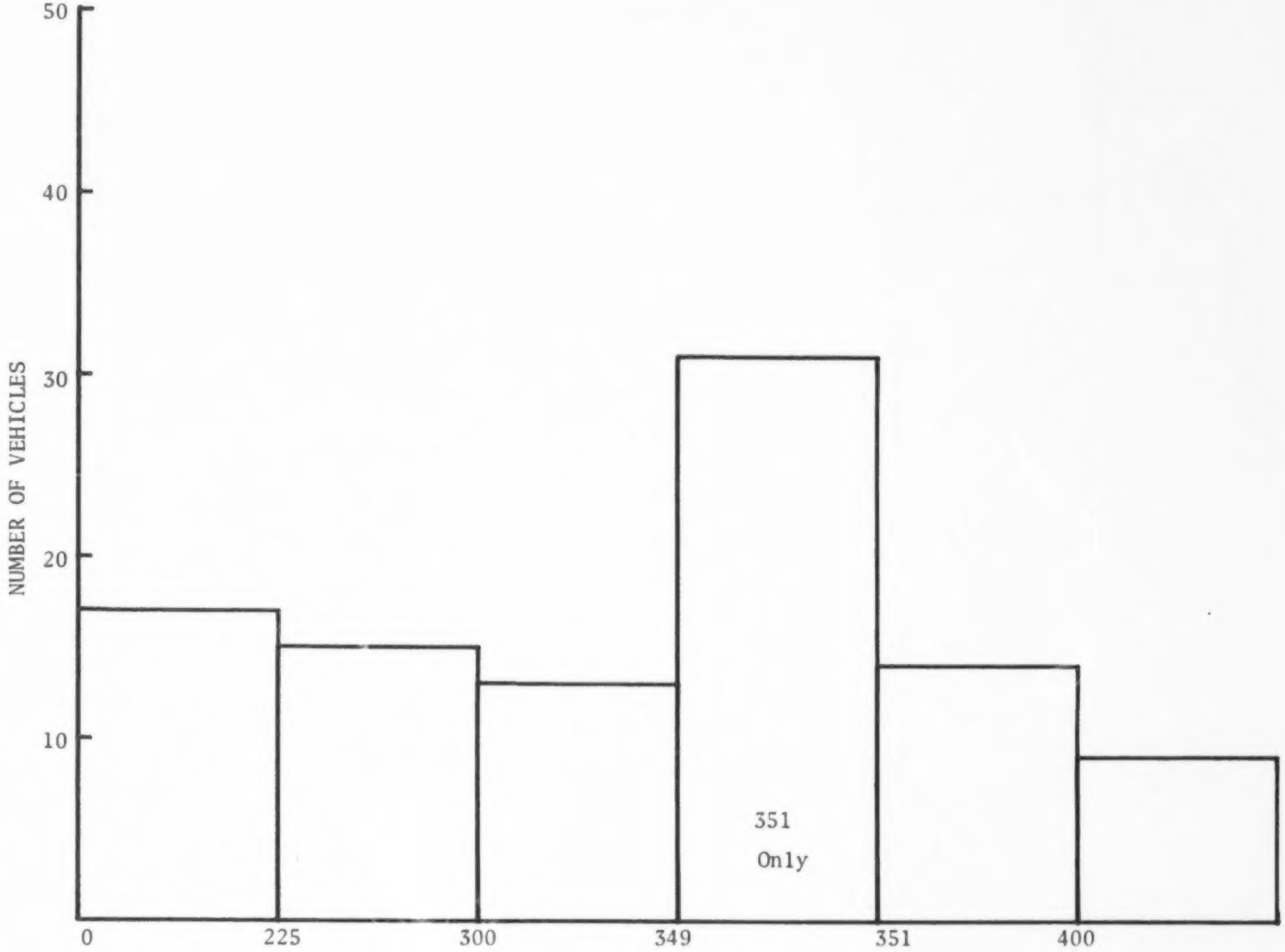


FIGURE 4-18 CUBIC INCH DISPLACEMENT FOR FORD VEHICLES

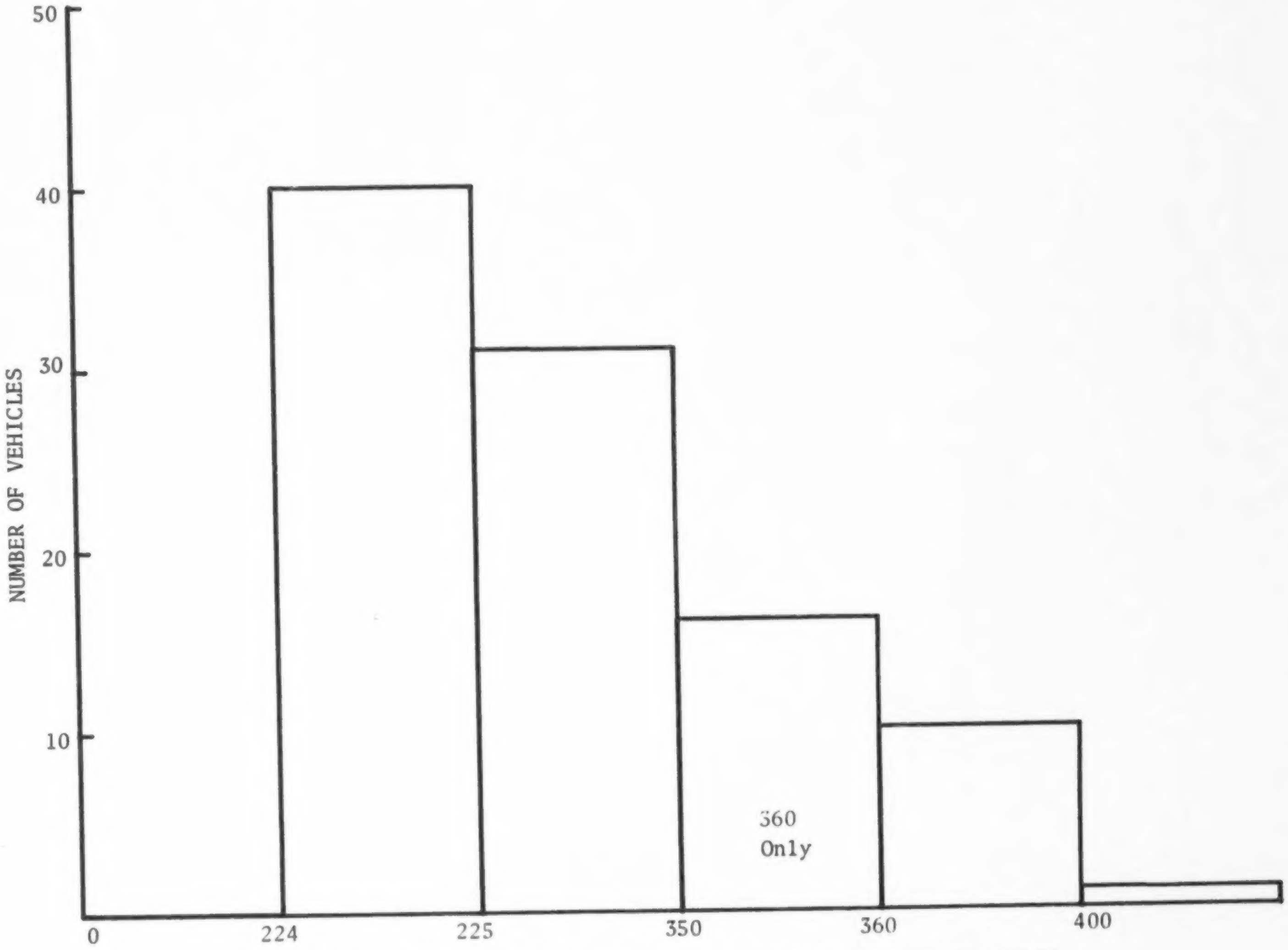


FIGURE 4-19 CUBIC INCH DISPLACEMENT FOR CHRYSLER VEHICLES

TABLE IV-1

PERCENT OF VEHICLES OUTSIDE
OF SPECIFICATIONS FOR TIMING, IDLE CO
AND IDLE RPM BY CITY

		Specification Group			
CITY	NO. OF CARS	TIMING	IDLE CO	IDLE RPM	OUTSIDE OF AT LEAST ONE SPECIFICATION
CHICAGO	100	24.0	40.0	27.0	68.0
DETROIT	100	36.0	37.0	46.0	74.0
WASHINGTON	100	45.0	41.0	33.0	75.0
TOTAL	300	35.0	39.3	35.3	72.3

TABLE IV-2

PERCENT OF VEHICLES OUTSIDE OF SPECIFICATIONS FOR TIMING, IDLE CO, AND IDLE RPM BY MANUFACTURER

MANUFACTURER	NO. OF CARS	Specification Group			OUTSIDE OF AT LEAST ONE SPECIFICATION
		TIMING	IDLE CO	IDLE RPM	
GENERAL MOTORS	102	32.3	27.4	25.5	60.8
FORD	99	37.4	15.2	34.3	63.6
CHRYSLER	99	35.4	75.8	46.5	92.9
TOTAL	300	35.0	39.3	35.3	72.3

Group Designation	Specification Group	Hydrocarbons	Cold Stabilized Hydrocarbons	Hot Transient Hydrocarbons	Cold Transient Hydrocarbons	Carbon Monoxide	Cold Stabilized Carbon Monoxide	Hot Transient Carbon Monoxide	Cold Transient Carbon Monoxide	NO_X	Cold Stabilized NO_X	Hot Transient NO_X	Cold Transient NO_X	Urban Fuel Economy	Highway Fuel Economy	
GENERAL MOTORS	TIMING													X	X	
	IDLE CO	X	X	X	X	X	X	X	X							
	IDLE RPM									X		X	X			
	AT LEAST ONE															
FORD	TIMING															
	IDLE CO					X	X	X	X					X	X	
	IDLE RPM	X			X											
	AT LEAST ONE	X	X			X	X	X								
CHRYSLER	TIMING		X	X		X	X						X			
	IDLE CO	X	X	X	X	X	X		X							
	IDLE RPM	X	X	X		X	X	X	X							
	AT LEAST ONE	X	X		X	X	X	X	X							
ALL VEHICLES IN ALL CITIES	TIMING	X	X	X		X	X	X								
	IDLE CO	X	X	X	X	X	X	X	X							
	IDLE RPM															
	AT LEAST ONE	X	X	X	X	X	X	X	X							

*An X indicates significance at the 0.05 significance level

TABLE IV-3 TABLE OF THOSE VALUES WITH STATISTICALLY SIGNIFICANT* DIFFERENCES BETWEEN THE MEANS OF EMISSIONS AND FUEL ECONOMIES WITHIN TOLERANCES AND OUTSIDE OF TOLERANCES FOR IDLE CO, RPM, AND TIMING

TABLE IV-4 PERCENT OF VEHICLES FAILING AT LEAST ONE EMISSION STANDARD FOR VEHICLES WITHIN AND OUTSIDE OF SPECIFICATION TOLERANCES

Manufacturer	Specification Group	No. of Cars Outside Specs	Percent of Vehicles Failing FTP Standards and Outside of Specifications	No. of Cars Within Specs	Percent of Vehicles Failing FTP Standards and Within Specifications
GENERAL MOTORS	TIMING	33	60.6	69	44.9
	IDLE RPM	26	61.5	76	46.0
	IDLE CO	28	96.4	74	32.4
	AT LEAST ONE	62	64.5	40	27.5
FORD	TIMING	37	48.6	62	38.7
	IDLE RPM	34	44.1	65	41.5
	IDLE CO	15	60.0	84	39.3
	AT LEAST ONE	63	42.8	36	41.7
CHRYSLER	TIMING	35	97.1	64	75.0
	IDLE RPM	46	78.3	53	86.8
	IDLE CO	75	93.3	24	50.0
	AT LEAST ONE	92	84.8	7	57.1
TOTAL	TIMING	105	68.6	195	52.8
	IDLE RPM	106	63.2	194	55.7
	IDLE CO	118	89.8	182	37.9
	AT LEAST ONE	217	66.8	83	36.1

TABLE IV-5 PERCENT OF VEHICLES FAILING THE HC STANDARD FOR VEHICLES WITHIN AND OUTSIDE OF SPECIFICATION TOLERANCES

Manufacturer	Specification Group	No. of Cars Outside Specs	Percent of Vehicles Failing HC Standards and Outside of Specification Tolerances	No. of Cars Within Specs	Percent of Vehicles Failing HC Standards and Within Specifications
GENERAL MOTORS	TIMING	33	27.3	69	15.9
	IDLE RPM	26	30.8	76	15.8
	IDLE CO	28	71.4	74	0.0
	AT LEAST ONE	62	32.3	40	0.0
FORD	TIMING	37	16.2	62	6.4
	IDLE RPM	34	20.6	65	4.6
	IDLE CO	15	26.7	84	7.1
	AT LEAST ONE	63	15.9	36	0.0
CHRYSLER	TIMING	35	68.6	64	53.1
	IDLE RPM	46	47.8	53	67.9
	IDLE CO	75	73.3	24	12.5
	AT LEAST ONE	92	60.9	7	28.6
TOTAL	TIMING	105	37.1	195	25.1
	IDLE RPM	106	34.9	194	26.3
	IDLE CO	118	66.9	182	4.9
	AT LEAST ONE	217	39.6	83	2.4

TABLE IV-6 PERCENT OF VEHICLES FAILING THE CO STANDARD FOR VEHICLES WITHIN AND OUTSIDE OF SPECIFICATION TOLERANCES

Manufacturer	Specification Group	No. of Cars Outside Specs	Percent of Vehicles Failing CO Standards and Outside of Specification Tolerances	No. of Cars Within Specs	Percent of Vehicles Failing CO Standards and Within Specifications
GENERAL MOTORS	TIMING	33	39.4	69	27.5
	IDLE RPM	26	46.1	76	26.3
	IDLE CO	28	96.4	74	6.8
	AT LEAST ONE	62	48.4	40	5.0
FORD	TIMING	37	24.3	62	11.3
	IDLE RPM	34	17.6	65	15.4
	IDLE CO	15	53.3	84	9.5
	AT LEAST ONE	63	23.8	36	2.8
CHRYSLER	TIMING	35	77.1	64	64.1
	IDLE RPM	46	63.0	53	73.6
	IDLE CO	75	86.7	24	12.5
	AT LEAST ONE	92	71.7	7	28.6
TOTAL	TIMING	105	46.7	195	34.4
	IDLE RPM	106	44.3	194	35.6
	IDLE CO	118	84.7	182	8.8
	AT LEAST ONE	217	51.1	83	6.0

TABLE IV-7 PERCENT OF VEHICLES FAILING THE NOX STANDARD FOR VEHICLES WITHIN AND OUTSIDE OF SPECIFICATION TOLERANCES

Manufacturer	Specification Group	No. of Cars Outside Specs	Percent of Vehicles Failing NOX Standard and Outside of Specification Tolerances	No. of Cars Within Specs	Percent of Vehicles Failing NOX Standards and Within Specifications
GENERAL MOTORS	TIMING	33	24.2	69	24.6
	IDLE RPM	26	15.4	76	27.6
	IDLE CO	28	17.9	74	27.0
	AT LEAST ONE	62	24.2	40	25.0
FORD	TIMING	37	29.7	62	29.0
	IDLE RPM	34	32.3	65	27.7
	IDLE CO	15	20.0	84	30.9
	AT LEAST ONE	63	23.8	36	38.9
CHRYSLER	TIMING	35	51.4	64	21.9
	IDLE RPM	46	32.6	53	32.1
	IDLE CO	75	30.7	24	37.5
	AT LEAST ONE	92	32.6	7	28.6
TOTAL	TIMING	105	35.2	195	25.1
	IDLE RPM	106	28.3	194	28.9
	IDLE CO	118	26.3	182	30.2
	AT LEAST ONE	217	27.6	83	31.3

TABLE IV-8 FTP EMISSIONS LEVELS AT VARYING DEGREES OF DEVIATION FROM THE .5% IDLE CO FOR ALL VEHICLES

DEVIATIONS* FROM .5%	NO. CARS	HYDROCARBONS (gm/mi) ARITHMETIC		CARBON MONOXIDE (gm/mi) ARITHMETIC		NO_X ** (gm/mi) ARITHMETIC	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
-1 to -2 ***	164	0.77	0.38	6.49	4.81	2.79	1.10
0 to -1	15	1.16	0.32	15.36	10.27	3.38	1.50
0	3	1.13	0.13	14.93	3.68	2.79	1.04
0 to +1	9	1.83	0.84	23.19	19.21	3.44	2.18
+1 to +2	6	1.74	1.45	34.00	41.89	2.32	1.01
+2 to +3	7	1.29	0.66	21.99	23.43	2.26	0.67
+3 to +4	4	1.27	0.52	11.51	7.32	2.51	0.90
+4 to +5	3	1.73	0.41	37.99	9.80	3.00	1.04
+5 to +6	2	1.23	0.83	30.03	1.75	4.32	2.51
+6 to +7	10	1.65	0.66	30.12	13.81	2.82	1.62
+7 to +8	2	3.64	1.49	50.83	0.74	2.95	2.68
+8 to +9	9	1.56	0.72	29.68	19.64	2.67	1.00
+9 to +10	3	2.14	0.77	34.51	15.76	2.39	0.35
+10 to +11	9	2.09	0.89	35.97	11.68	2.49	0.73
+11 to +12	1	1.40	-	41.03	-	1.71	-
+12 to +13	6	2.60	2.23	44.49	45.70	2.52	1.62
+13 to +14	2	1.85	0.25	44.11	4.64	3.44	0.03
+14 to +15	0	-	-	-	-	-	-
+15 to +16	1	2.52	-	81.17	-	2.36	-
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+19 to +20	2	3.30	2.84	41.75	22.64	7.81	0.83
over +20	42						
⋮							

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[*] One deviation corresponds to 0.25% from the .5% Idle CO

[**] NO_X corrected for humidity

[***] There are 111 vehicles between 0 and 0.025% idle CO

TABLE IV-9 FTP EMISSIONS LEVELS AT VARYING DEGREES OF DEVIATION FROM THE .5% IDLE CO FOR CHRYSLER VEHICLES

DEVIATIONS* FROM .5%	NO. CARS	HYDROCARBONS (gm/mi) ARITHMETIC		CARBON MONOXIDE (gm/mi) ARITHMETIC		NO_X** (gm/mi) ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
-1 to -2	15	1.06	0.42	8.95	3.50	2.91	0.80
0 to -1	7	1.10	0.43	11.47	12.10	3.26	1.63
0	2	1.06	0.06	13.65	4.14	2.33	0.97
0 to +1	8	1.89	0.88	25.53	20.51	3.53	2.32
+1 to +2	4	2.20	1.63	42.24	51.51	2.53	1.22
+2 to +3	3	1.66	0.69	32.21	34.81	2.70	0.15
+3 to +4	2	1.46	0.48	14.15	1.69	3.12	0.93
+4 to +5	2	1.88	0.45	39.63	13.27	2.80	1.39
+5 to +6	1	1.17	-	31.27	-	2.59	-
+6 to +7	6	1.65	0.63	30.01	10.17	3.21	2.06
+7 to +8	1	4.69	-	50.30	-	1.05	-
+8 to +9	7	1.64	0.81	32.02	22.01	2.79	1.00
+9 to +10	0	-	-	-	-	-	-
+10 to +11	6	2.14	1.07	37.00	14.42	2.74	0.60
+11 to +12	1	1.40	-	41.03	-	1.71	-
+12 to +13	2	3.51	0.77	68.00	21.58	3.66	2.61
+13 to +14	1	2.03	-	47.39	-	3.46	-
+14 to +15	0	-	-	-	-	-	-
+15 to +16	1	2.52	-	81.17	-	2.36	-
⋮ ⋮ ⋮							
+19 to +20	2	3.30	2.84	41.75	22.64	7.81	0.83
over +20	28						

*One deviation corresponds to 0.25% from the .5% Idle CO

**NO_X corrected for humidity

TABLE IV-10 FTP EMISSIONS LEVELS AT VARYING DEGREES OF DEVIATION FROM THE .5% IDLE CO FOR GENERAL MOTORS VEHICLES

Deviations* from .5%	No. Cars	Hydrocarbons (gm/mi) Arithmetic		Carbon Monoxide (gm/mi) Arithmetic		NOx** (gm/mi) Arithmetic	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
-1 to -2	74	0.59	0.22	6.93	4.71	2.84	1.20
0 to -1	0	-	-	-	-	-	-
0	0	-	-	-	-	-	-
0 to +1	0	-	-	-	-	-	-
+1 to +2	1	0.84	-	17.84	-	2.08	-
+2 to +3	2	1.51	0.03	22.39	6.59	2.42	0.20
+3 to +4	1	1.56	-	16.94	-	1.68	-
+4 to +5	1	1.42	-	34.71	-	3.40	-
+5 to +6	1	1.29	-	28.79	-	6.09	-
+6 to +7	2	1.28	0.61	18.42	14.26	2.26	0.22
+7 to +8	0	-	-	-	-	-	-
+8 to +9	2	1.27	0.06	21.49	2.54	2.27	1.25
+9 to +10	3	2.14	0.77	34.51	15.76	2.39	0.35
+10 to +11	3	2.00	0.54	33.92	4.02	1.99	0.81
+11 to +12	0	-	-	-	-	-	-
+12 to +13	1	6.20	-	111.69	-	1.75	-
+13 to +14	1	1.67	-	40.83	-	3.42	-
+14 to +15	0	-	-	-	-	-	-
+15 to +16	0	-	-	-	-	-	-
⋮ ⋮							
+19 to +20	0	-	-	-	-	-	-
over +20	8	2.30	0.42	54.74	17.31	2.78	1.46

*One deviation corresponds to 0.25% from the .5% Idle CO

**NOX corrected for humidity

TABLE IV-11 FTP EMISSION LEVELS AND URBAN AND HIGHWAY FUEL ECONOMY AT VARYING DEGREES OF DEVIATION FROM IDLE RPM SPECIFICATIONS FOR ALL VEHICLES IN AS-RECEIVED CONDITION

DEVIATIONS** FROM SPECIFICATION	NO. CARS	HYDROCARBONS (gm/mi) ARITHMETIC		CARBON MONOXIDE (gm/mi) ARITHMETIC		NO_X* (gm/mi) ARITHMETIC		FUEL ECONOMY ECONOMY (mi/gal) HARMONIC		HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
-3 and beyond	11	1.94	1.11	22.69	17.38	2.95	0.98	13.34	1.47	18.68	1.92
-2 to -3	19	1.39	1.32	18.95	27.14	2.69	1.11	13.95	3.08	19.44	3.79
-1 to -2	23	0.93	0.57	12.30	15.65	2.17	0.53	13.62	2.89	19.21	3.45
0 to -1	61	1.11	0.84	15.20	18.12	2.80	1.01	13.46	2.32	18.82	2.96
0	39	1.23	0.93	19.72	25.74	3.29	1.67	13.82	2.60	19.22	3.38
0 to +1	51	1.32	1.08	19.06	23.55	2.75	0.97	13.35	2.12	19.06	2.54
+1 to +2	51	1.58	1.05	29.37	27.87	2.63	1.05	13.52	2.32	19.52	3.52
+2 to +3	18	1.56	1.03	24.68	22.21	3.39	2.18	13.32	2.38	19.47	2.96
+3 to +4	14	1.35	0.69	21.90	21.69	3.19	1.38	15.48	3.44	22.40	4.06
+4 to +5	6	0.76	0.35	11.39	13.08	2.40	1.08	18.73	5.40	28.26	6.43
+5 and beyond	7	1.80	1.25	28.42	19.54	2.80	1.07	14.00	2.12	21.26	1.34

*NO_X corrected for humidity

**One deviation corresponds to 50 RPM from the specification

TABLE IV-12 FTP EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMY AT VARYING DEGREES OF DEVIATION FROM TIMING SPECIFICATION FOR ALL VEHICLES IN AS-RECEIVED CONDITION

DEVIATIONS** FROM SPECIFICATION	NO. CARS	HYDROCARBONS (gm/mi) ARITHMETIC		CARBON MONOXIDE (gm/mi) ARITHMETIC		NO_X* (gm /mi) ARITHMETIC		URBAN FUEL ECONOMY (mi /gal) HARMONIC		HIGHWAY FUEL ECONOMY (mi /gal) HARMONIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
-2 and beyond	13	1.40	0.73	19.74	18.78	2.11	0.89	13.51	3.17	19.40	4.42
-1 to -2	12	1.09	0.53	17.50	16.19	2.62	0.91	12.16	2.13	17.27	3.01
0 to -1	59	1.23	0.99	17.73	21.18	2.84	1.38	13.68	2.52	19.66	3.76
0	152	1.18	0.90	16.43	18.52	2.72	1.12	13.74	2.47	19.42	3.09
0 to +1	35	1.70	1.16	29.77	30.02	2.93	1.29	13.95	2.55	19.66	3.12
+1 to +2	15	1.93	1.14	40.86	38.99	3.76	1.76	14.04	2.85	20.28	3.46
+2 and beyond	14	1.82	1.28	29.41	26.64	3.39	0.95	14.08	2.33	19.98	3.11

[*] NO_X corrected for humidity.

[**] One deviation corresponds to 2° from the specification.

TABLE IV-13

URBAN AND HIGHWAY FUEL ECONOMY ON AS-RECEIVED TEST AT VARYING LEVELS OF DEVIATION FROM .5% IDLE CO FOR ALL VEHICLES

DEVIATIONS[*] FROM .5% IDLE CO	NO. CARS	URBAN FUEL ECONOMY (mi/gal) HARMONIC		HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC	
		MEAN	S.D.	MEAN	S.D.
-1 to -2	164	13.85	2.67	19.45	3.61
0 to -1	15	13.51	2.50	19.33	3.13
0	3	14.35	4.92	20.88	4.19
0 to +1	9	13.01	1.74	19.38	2.36
+1 to +2	6	15.29	2.74	20.50	4.60
+2 to +3	7	12.64	2.20	18.33	2.48
+3 to +4	4	14.66	2.89	20.61	2.80
+4 to +5	3	13.08	3.19	18.75	3.58
+5 to +6	2	11.80	0.09	18.04	3.02
+6 to +7	10	14.14	2.55	20.34	2.96
+7 to +8	2	12.56	0.56	18.30	0.17
+8 to +9	9	13.66	2.70	19.30	3.88
+9 to +10	3	13.26	1.34	18.29	1.38
+10 to +11	9	13.98	3.29	20.00	3.63
+11 to +12	1	11.60	-	19.84	-
+12 to +13	6	11.83	1.81	17.20	3.37
+13 to +14	2	13.84	3.43	21.05	5.50
+14 to +15	0	-	-	-	-
+15 to +16	1	11.36	-	17.86	-
⋮ ⋮ ⋮					
+19 to +20	2	15.02	2.47	21.30	2.53
over +20	42				

[*] One deviation corresponds to 0.25% from .5% Idle CO.

TABLE IV-14

URBAN AND HIGHWAY FUEL ECONOMY ON AS-RECEIVED TEST AT VARYING LEVELS OF DEVIATION FROM .5% IDLE CO FOR GENERAL MOTORS VEHICLES

		URBAN FUEL ECONOMY (mi/gal)		HIGHWAY FUEL ECONOMY (mi/gal)	
DEVIATIONS* FROM .5% IDLE CO	NO. CARS	HARMONIC MEAN	S.D.	HARMONIC MEAN	S.D.
-1 to -2	74	13.88	2.57	19.47	3.52
0 to -1	0	-	-	-	-
0	0	-	-	-	-
0 to +1	0	-	-	-	-
+1 to +2	1	20.30	-	28.31	-
+2 to +3	2	13.41	0.24	19.57	1.29
+3 to +4	1	15.02	-	20.91	-
+4 to +5	1	11.84	-	16.20	-
+5 to +6	1	11.87	-	16.13	-
+6 to +7	2	15.04	2.30	21.85	3.81
+7 to +8	0	-	-	-	-
+8 to +9	2	12.93	4.11	18.49	6.11
+9 to +10	3	13.26	1.34	18.29	1.38
+10 to +11	3	13.66	3.39	19.90	4.71
+11 to +12	0	-	-	-	-
+12 to +13	1	13.37	-	20.65	-
+13 to +14	1	11.77	-	17.77	-
+14 to +15	0	-	-	-	-
+15 to +16	0	-	-	-	-
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+19 to +20	0	-	-	-	-
+20 to end	8	12.94	1.45	18.67	2.09

*One deviation corresponds to 0.25% from .5% Idle CO.

TABLE IV-15

URBAN AND HIGHWAY FUEL ECONOMY ON AS-RECEIVED TEST AT VARYING LEVELS OF DEVIATION FROM .5% IDLE CO FOR CHRYSLER VEHICLES

DEVIATIONS* FROM .5% IDLE CO	NO. CARS	URBAN FUEL ECONOMY (mi/gal) HARMONIC MEAN	URBAN FUEL ECONOMY (mi/gal) S.D.	HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC MEAN	HIGHWAY FUEL ECONOMY (mi/gal) S.D.
-1 to -2	15	14.11	2.77	19.83	2.96
0 to -1	7	15.16	3.74	21.64	4.24
0	2	15.21	7.48	22.04	5.87
0 to +1	8	12.95	1.83	19.37	2.52
+1 to +2	4	14.84	2.36	20.18	4.13
+2 to +3	3	13.81	2.91	19.87	1.78
+3 to +4	2	14.50	4.87	21.07	4.87
+4 to +5	2	13.81	4.66	20.35	4.19
+5 to +6	1	11.73	-	20.47	-
+6 to +7	6	15.00	2.62	21.32	2.19
+7 to +8	1	12.17	-	18.18	-
+8 to +9	7	13.89	2.52	19.54	3.61
+9 to +10	0	-	-	-	-
+10 to +11	6	14.15	3.57	20.05	3.48
+11 to +12	1	11.60	-	19.84	-
+12 to +13	2	13.16	2.10	19.57	2.54
+13 to +14	1	16.78	-	25.83	-
+14 to +15	0	-	-	-	-
+15 to +16	1	11.36	-	17.86	-
⋮ ⋮ ⋮					
+19 to +20	2	15.02	2.47	21.30	2.53
over +20	29				

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[*] One deviation corresponds to 0.25% from .5% Idle CO.

TABLE IV-16

URBAN AND HIGHWAY FUEL ECONOMY ON AS-RECEIVED TEST AT VARYING LEVELS OF DEVIATION FROM .5% IDLE CO FOR FORD VEHICLES

DEVIATIONS* FROM SPECIFICATION	NO. CARS	URBAN FUEL ECONOMY (mi/gal) HARMONIC MEAN	URBAN FUEL ECONOMY (mi/gal) S.D.	HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC MEAN	HIGHWAY FUEL ECONOMY (mi/gal) S.D.
-1 to -2	75	13.78	2.77	19.35	3.82
0 to -1	8	12.33	0.77	17.68	1.15
0	1	12.90	-	18.88	-
0 to +1	1	13.57	-	19.48	-
+1 to +2	1	13.60	-	16.94	-
+2 to +3	2	10.68	0.99	15.53	0.49
+3 to +4	1	14.66	-	19.48	-
+4 to +5	0	-	-	-	-
+5 to +6	0	-	-	-	-
+6 to +7	2	11.49	0.44	16.84	1.24
+7 to +8	1	12.96	-	18.42	-
+8 to +9	0	-	-	-	-
+9 to +10	0	-	-	-	-
+10 to +11	0	-	-	-	-
+11 to +12	0	-	-	-	-
+12 to +13	3	10.70	1.17	15.14	2.42
+13 to +14	0	-	-	-	-
+15 to +16	0	-	-	-	-
⋮ ⋮ ⋮					
+19 to +20	0	-	-	-	-
⋮ ⋮					
over +20	5				

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*One deviation corresponds to 0.25% from .5% Idle CO.

TABLE IV-17

URBAN AND HIGHWAY FUEL ECONOMY ON AS-RECEIVED TEST AT VARYING LEVELS OF DEVIATION FROM SPECIFICATION FOR TIMING FOR GM VEHICLES

DEVIATIONS* FROM SPECIFICATION	NO. CARS	URBAN FUEL ECONOMY (mi/gal) HARMONIC MEAN	URBAN FUEL ECONOMY (mi/gal) S.D.	HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC MEAN	HIGHWAY FUEL ECONOMY (mi/gal) S.D.
-2 and beyond	4	11.31	1.00	16.77	1.57
-1 to -2	6	12.64	2.30	18.20	3.19
0 to -1	29	13.50	2.32	19.43	3.73
0	50	14.30	2.53	19.86	3.33
0 to +1	9	13.37	2.02	18.53	2.79
+1 to +2	3	15.49	4.14	22.06	4.67
+2 and beyond	1	13.24	-	19.11	-

*One deviation corresponds to 2° from specification.

5.0 EFFECT OF THE RESTORATIVE MAINTENANCE, TESTS 1-4, ON EMISSIONS AND FUEL ECONOMY

Thus far, only the results of Test 1, the initial test, of the RM program have been discussed. All 300 vehicles in the RM program received an initial test. Only 113 vehicles received Test 2 (after correction of maladjustments and disablements other than idle mixture and idle speed), 143 vehicles received Test 3 (after adjustment of idle settings), and 83 vehicles received Test 4 (after a major tune-up and replacement of any defective components). The procedure and sequence for vehicles taking each of the tests is outlined in the flow chart of Figure 5-1. (Table B-35 shows which tests were received and the pass FTP(P) or fail FTP(T) outcome of each test by individual vehicle.) Each test sequence is followed by an inspection procedure, and/or a correction procedure if needed, and/or a measurement procedure to determine if the vehicle passed the FTP standards.

The tests referred to in Figure 5-1 were chassis dynamometer tests conducted over the 1975 Federal Test Procedure (FTP), the Highway Fuel Economy Test (HFET) and five short cycle tests (which will be discussed in a following section). An inspection for maladjustments or disablements was conducted after the initial test on all 300 vehicles. The inspection results have been discussed in Section 3. Any maladjustments or disablements other than idle speed and idle mixture were then corrected. 113 vehicles were subjected to Test 2 after these corrections were made. (Test 2 vehicles may have either passed or failed Test 1.) All 300 vehicles underwent a check and a recording of the condition of the individual emission control devices. The emissions levels of all 300 vehicles were compared to the FTP standards. The idle speed and idle mixture levels were recorded for the 148 vehicles passing the FTP and these vehicles were excluded from the group taking Test 3. The 152 vehicles failing the FTP were inspected to determine if they were within the specifications for idle speed and idle mixture. The nine vehicles of the 152 vehicles inspected that were within manufacturer's specifications for idle speed and idle mixture were also excluded from the group of vehicles taking Test 3. There were 143 vehicles outside of manufacturer's specifications for idle speed and idle mixture, and these vehicles were then adjusted to specifications. All GM vehicles that failed the FTP standards prior to Test 3 had to

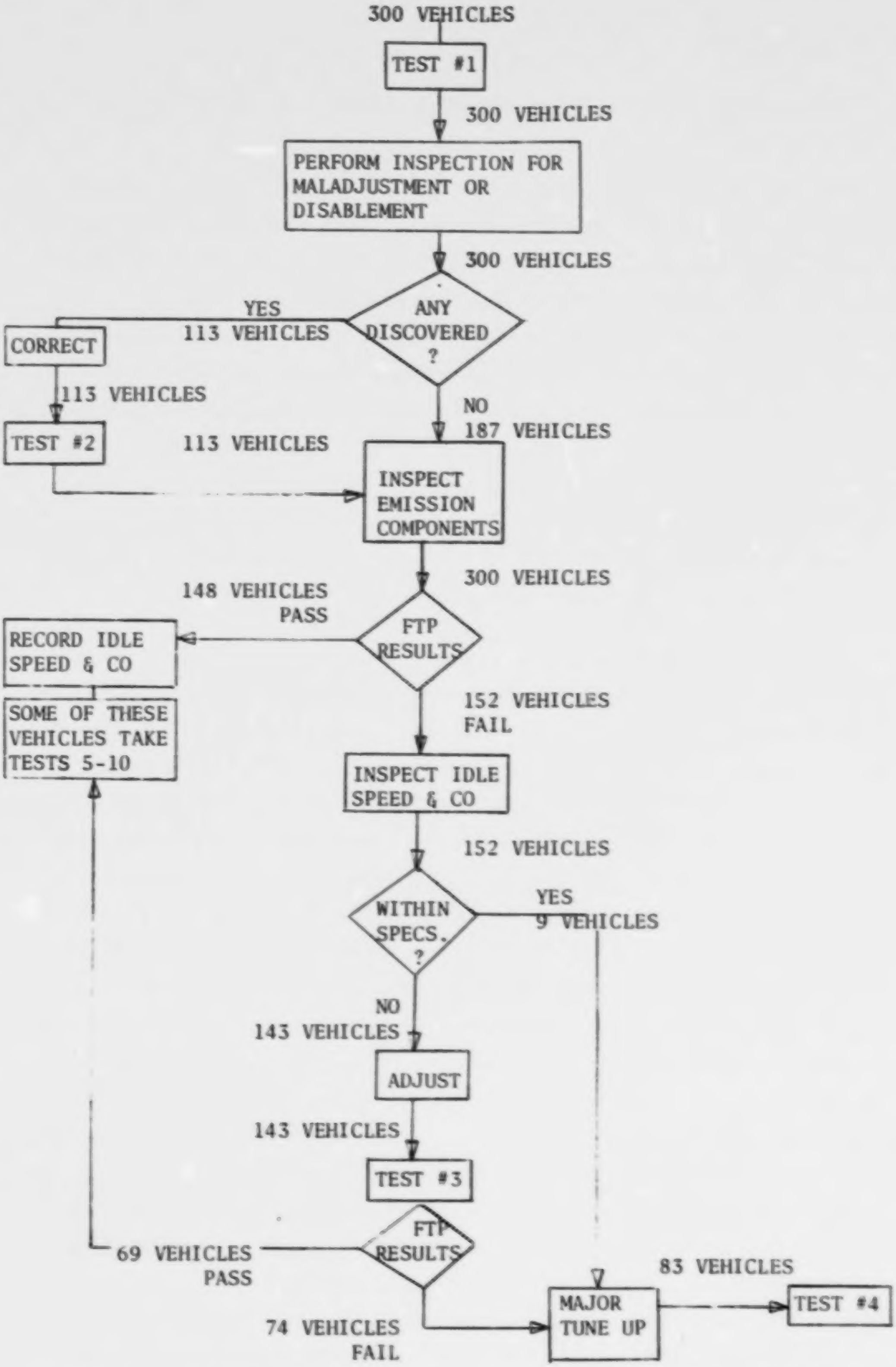
300 VEHICLES
TEST #1
300 VEHICLES
PERFORM INSPECTION FOR MALADJUSTMENT OR DISABLEMENT
300 VEHICLES
ANY DISCOVERED ?
YES
113 VEHICLES
CORRECT
113 VEHICLES
TEST #2
113 VEHICLES
NO
187 VEHICLES
INSPECT EMISSION COMPONENTS
300 VEHICLES
148 VEHICLES PASS
FTP RESULTS
RECORD IDLE SPEED & CO
SOME OF THESE VEHICLES TAKE TESTS 5-10
152 VEHICLES FAIL
INSPECT IDLE SPEED & CO
152 VEHICLES
WITHIN SPECS. ?
YES
9 VEHICLES
NO
143 VEHICLES
ADJUST
143 VEHICLES
TEST #3
FTP RESULTS
69 VEHICLES PASS
74 VEHICLES FAIL
MAJOR TUNE UP
83 VEHICLES
TEST #4

Figure 5-1 RESTORATIVE MAINTENANCE TEST SCENARIO FOR TESTS 1-4

have their idle mixture and idle speed adjusted since GM provides no idle CO specification but only provides a method of adjustment. Thus, technically, the GM vehicles cannot be said to be outside of manufacturer's idle mixture specifications. Of the 143 vehicles taking Test 3, 69 vehicles passed the FTP standards and were excluded from the group taking Test 4. Seventy-four vehicles failed the FTP standards after Test 3 and these vehicles, along with the nine vehicles originally within manufacturer's specifications for idle speed and idle mixture, received a major tune up which included correction of defective emission control devices. The 83 vehicles then received Test 4 and their emissions were measured to determine if they passed the FTP standards. Fifty six of the 83 vehicles failed the FTP standards after Test 4.

5.1 EMPIRICAL DISTRIBUTION OF EMISSIONS

Classically, it is assumed that as a result of random effects, the distribution of a measured variable is normal. Under this assumption, the usual procedures of analysis of variance can be employed and their findings evaluated according to standard statistics. Past EPA studies,[4] however, indicated that emissions data tended to follow a log-normal distribution rather than a normal distribution. Many possible reasons have been offered as to why emissions are log-normally distributed, among these that several sources of variability combine multiplicatively rather than additively as in a normal distribution. Investigation of the emissions from vehicles in the RM program indicate that emissions do tend towards log-normality. It is not the purpose of the RM program, however, to show that emissions follow any particular distribution, since often a distribution of variables can be shown to be both normally and log-normally distributed. The interpretation of influences and results, however, can be inaccurate if an incorrect assumption is made. In some cases, as will be shown, the assumption of normality is a very good one, whereas in other situations the assumption of normality will bias the results of statistical tests. However, it should be noted that nonparametric procedures which do not depend on the assumption of normality or data transformations may be used successfully in cases where the data are not normally distributed.

Figures 5-2 through 5-7 present the relationships between cubic inch displacement and emissions. There is no particular reason for using cubic inch displacement except to delineate each individual vehicle and its respective emission level in relation to the emission standard. Figure 5-2, for instance, demonstrates that most vehicles have HC emissions clustered very close to the HC standard. The vehicles greater than the standard have emissions spread over a much wider range. Figure 5-3 shows the effect on the vehicle distribution of plotting the natural log of the HC emissions. The natural log of the HC emissions are now more uniformly distributed over the entire range of HC emissions. The same result may be noted for CO and to a lesser extent for NO_x.

Visual examination of the distribution of emissions is not sufficient to prove log-normality so the natural logs of the emissions were tested for normality (if emissions are log-normally distributed then the distribution of the variables transformed into logarithm space should be normally distributed) using the Kolmogorov-Smirnov[5] (KS) statistic compared to the Lilliefors table of significant values. Results of the KS test show that the natural logs of emissions are normally distributed for the 300 vehicles in Test 1. The KS statistic is 0.085 for HC, 0.067 for CO, and 0.060 for NO_x and these values must be less than the asymptotic value $1.63/\sqrt{N} = 0.0941$ at the 0.01 level of significance. Results of the KS test for the original emissions data show the KS statistic is 0.156 for HC, 0.216 for CO and 0.141 for NO_x, all of which are greater than the asymptotic value of 0.0941. This result shows that CO values deviate the most from normality.

The KS test for normality was performed on the raw emissions levels for the vehicles taking Tests 2 through 4. At each test sequence the emissions, HC, CO, and NO_x were shown to deviate from a normal distribution except for NO_x for vehicles taking Test 4. The KS test was performed on the natural log of the emissions HC, CO, and NO_x at each test sequence. In every instance the natural logs of the emissions were shown to be normally distributed. Two important results of this analysis are: the distribution of CO emissions deviated from normality the most as compared to HC and NO_x at every test sequence 1 through 4, and NO_x emissions at Test 4 were shown to pass the KS test for normality for both raw data and log transformed data.

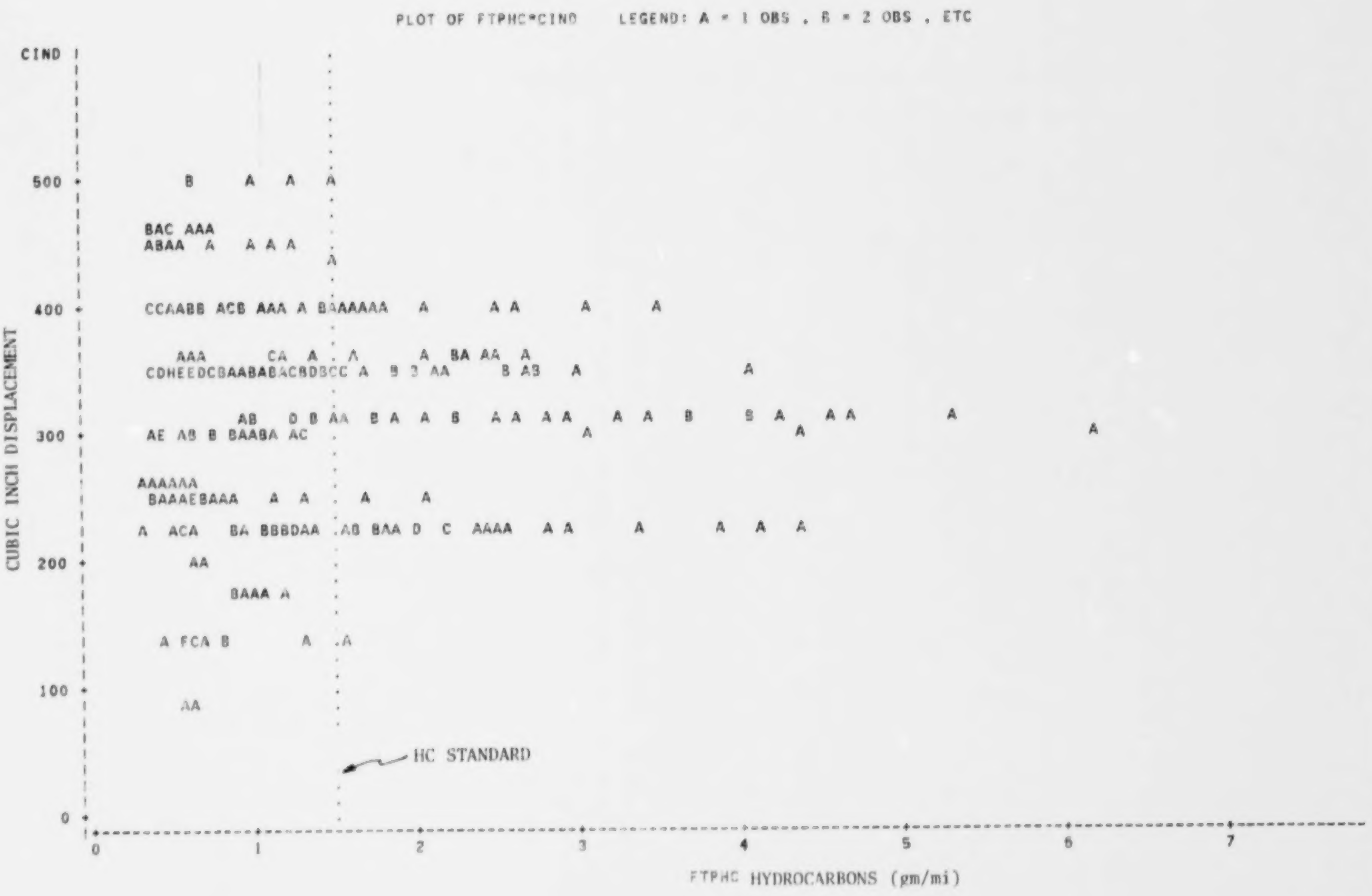

Figure 5-2 RELATIONSHIP BETWEEN CUBIC INCH DISPLACEMENT AND HC EMISSIONS

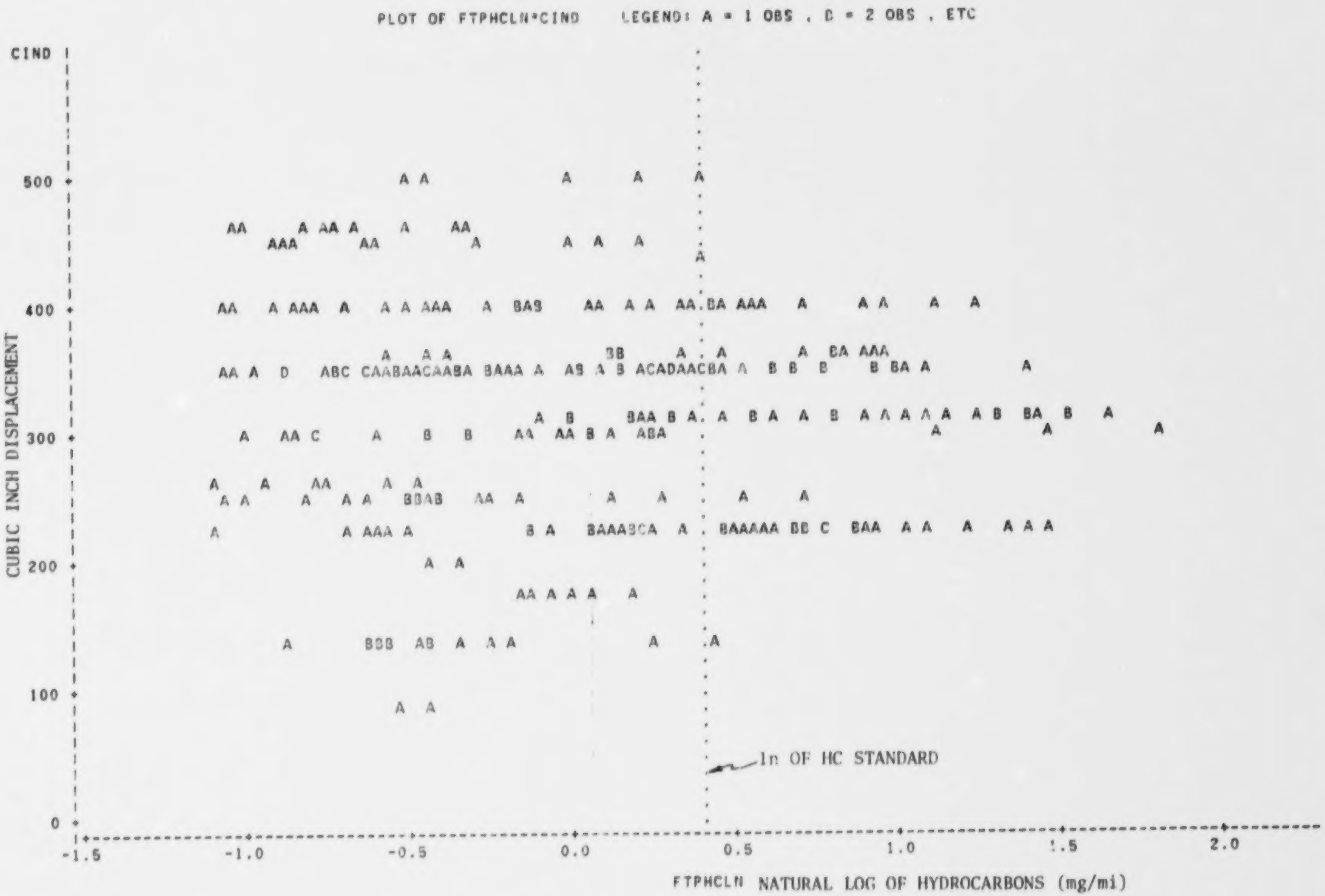

Figure 5-3 RELATIONSHIP BETWEEN CUBIC INCH DISPLACEMENT AND ln OF HC EMISSIONS

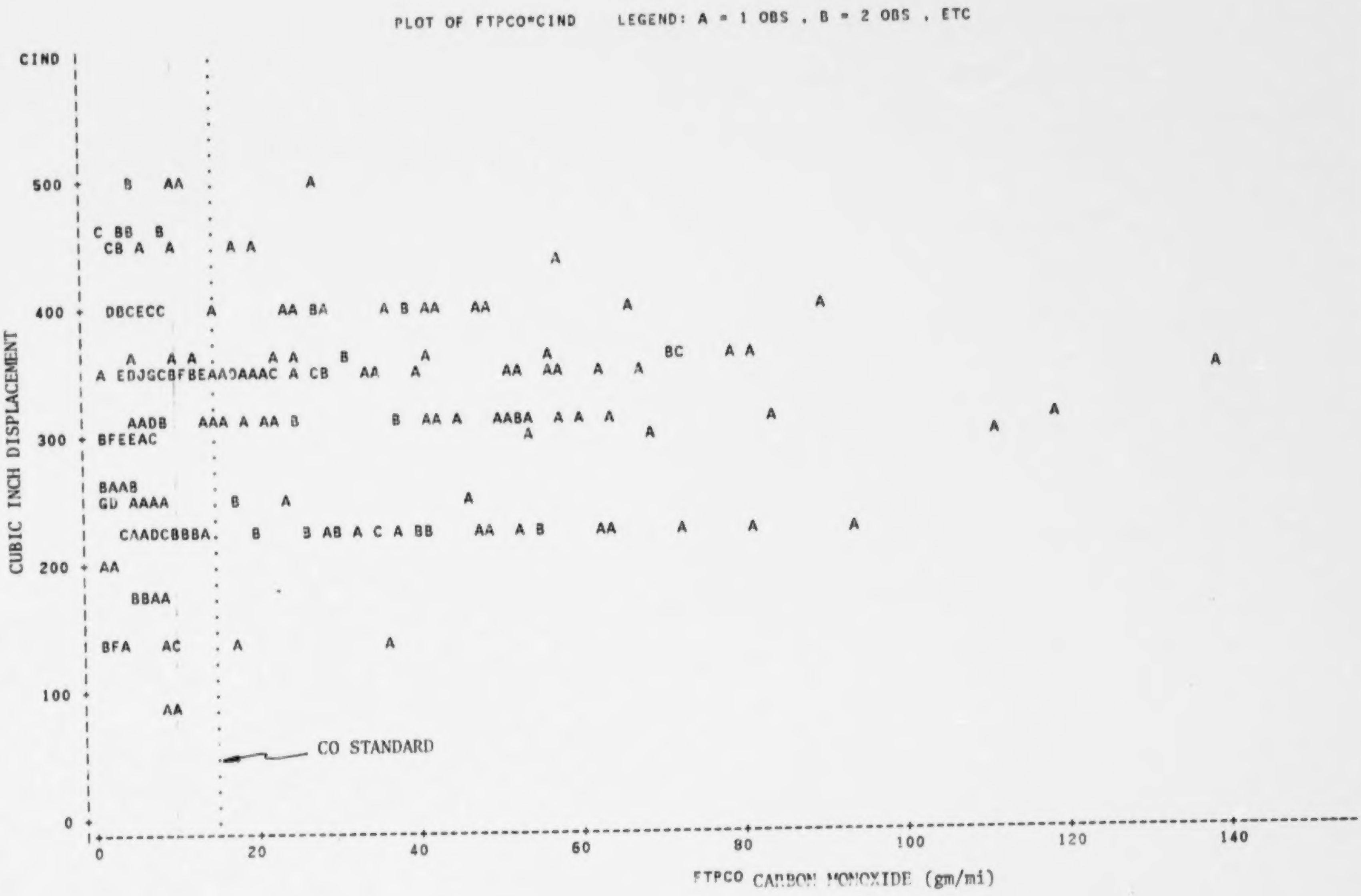

Figure 5-4 RELATIONSHIP BETWEEN CUBIC INCH DISPLACEMENT AND CO EMISSIONS

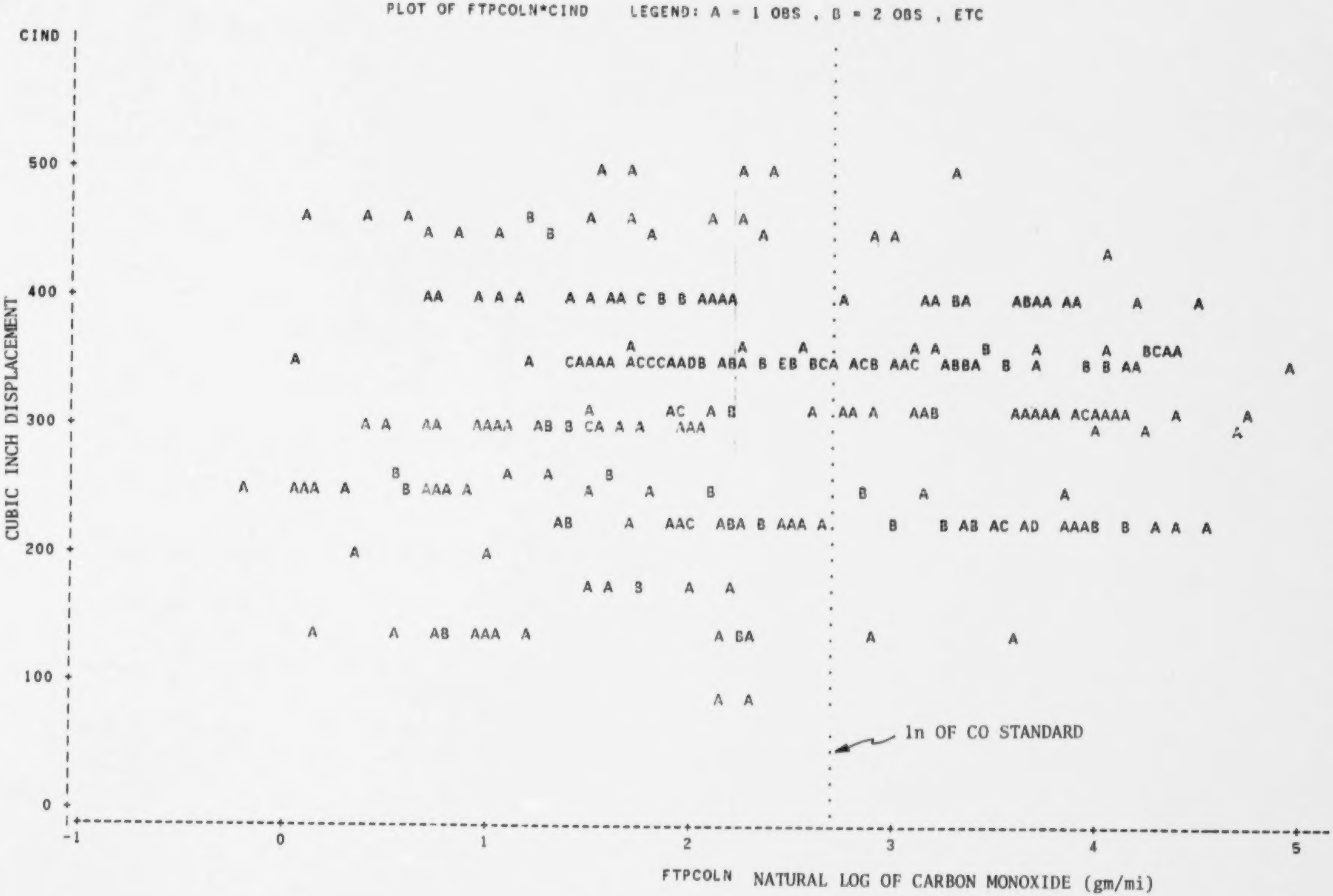

Figure 5-5 RELATIONSHIP BETWEEN CUBIC INCH DISPLACEMENT AND ln OF CO EMISSIONS

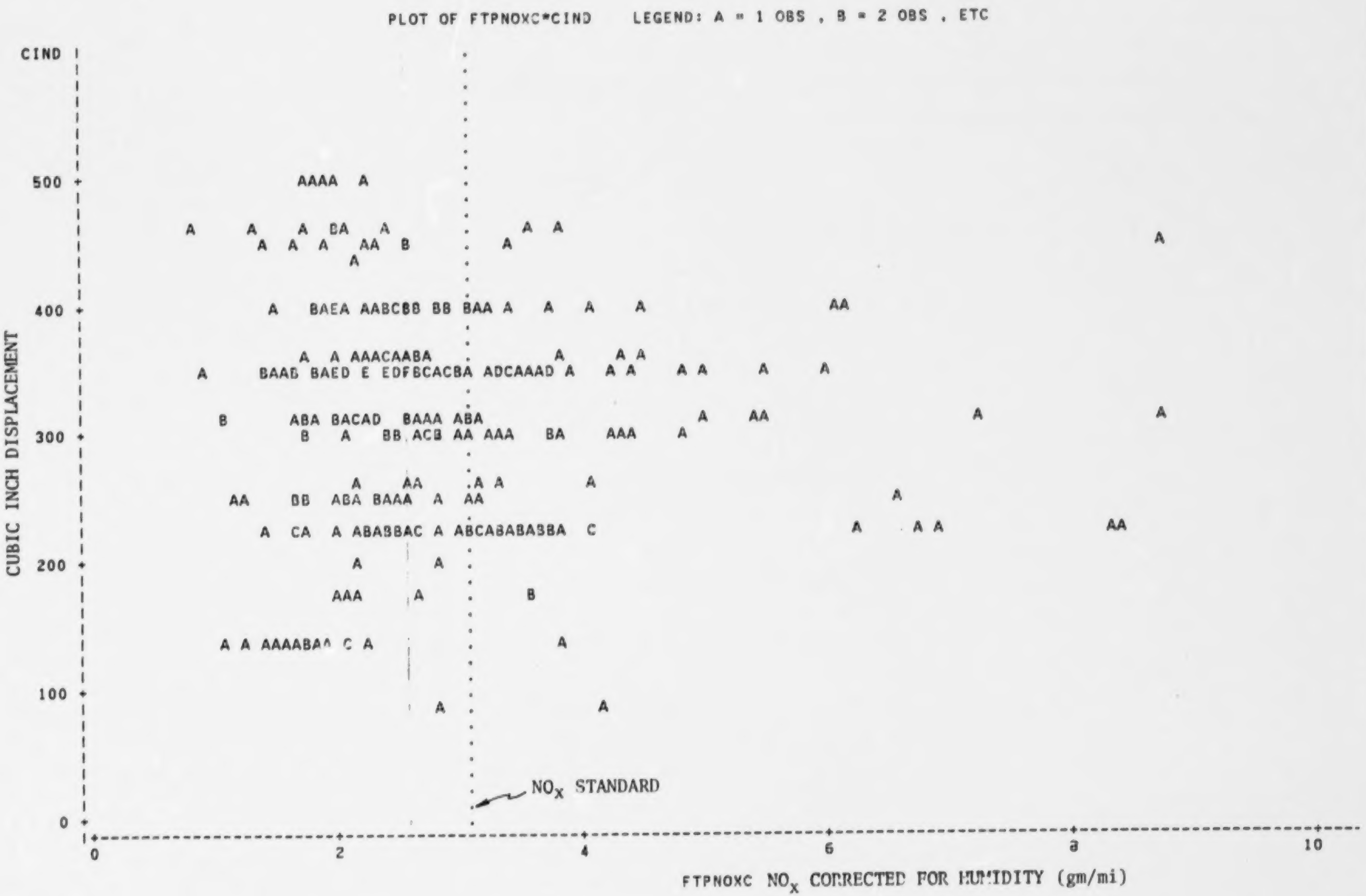

Figure 5-6 RELATIONSHIP BETWEEN CUBIC INCH DISPLACEMENT AND NO$_X$ EMISSIONS

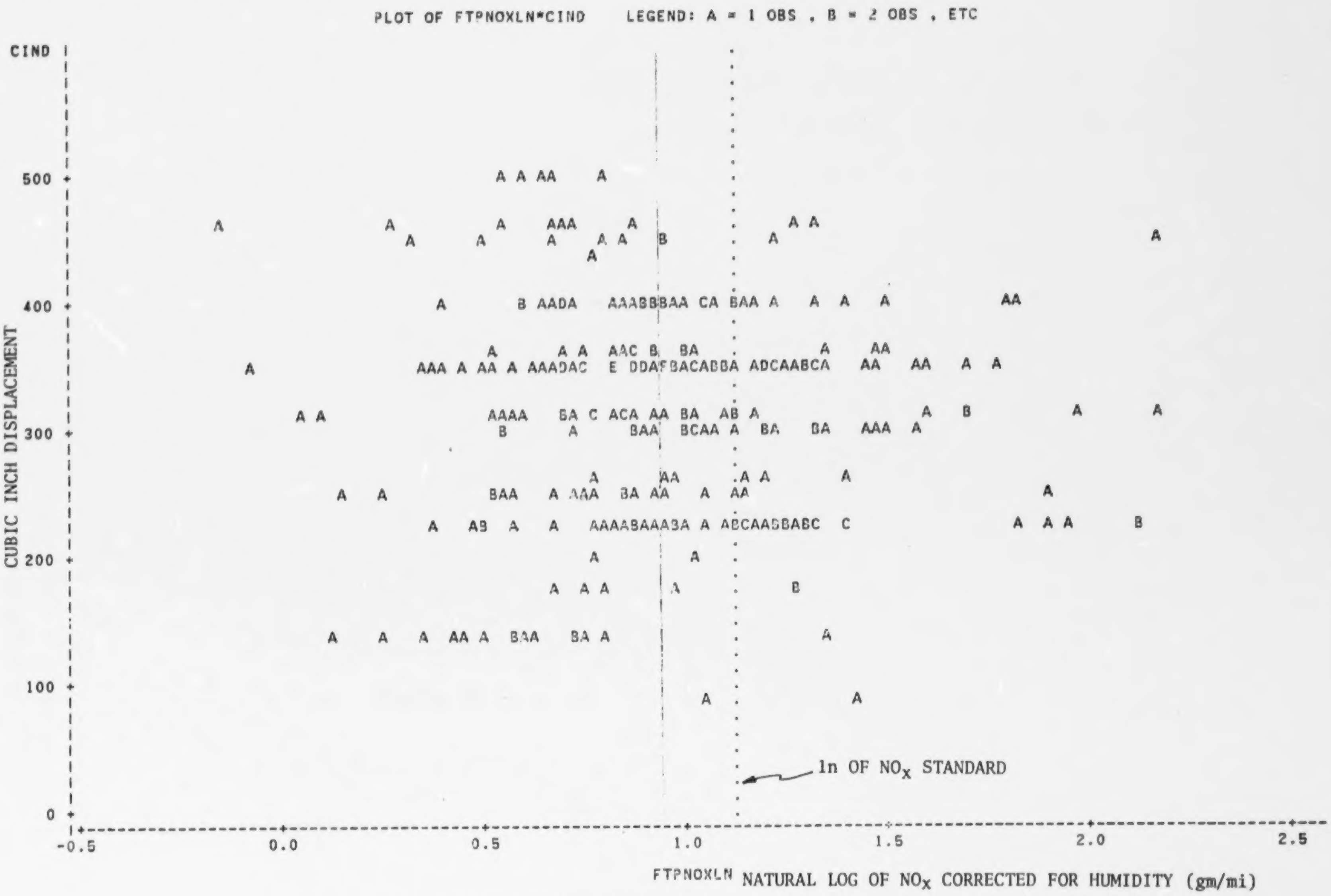

Figure 5-7 RELATIONSHIP BETWEEN CUBIC INCH DISPLACEMENT AND ln OF NO_x EMISSIONS

5.2 VEHICLE MEAN EMISSIONS FOR TEST SEQUENCES 1 THROUGH 4

The mean emission levels at each test sequence are given in Tables B-1 through B-18. There are two sets of mean values for each test sequence. The first set of values, Tables B-1 through B-16, represents the mean emissions of just those vehicles that received each test (i.e., the 300, 113, 143 and 83 vehicles that received tests 1, 2, 3 and 4, respectively). The mean emissions of these groups of vehicles may be used to estimate the collective effect of the specific set of maintenance procedures employed prior to the test on those vehicles requiring such maintenance. The second set of mean values, Tables B-17 and B-18, represents the mean emissions of all 300 vehicles at each test sequence (i.e., the mean emissions on the last test of the vehicles that did not receive the specified test averaged with the mean emissions on the given test of the vehicles that did receive that test). This latter set of mean emission levels gives a measure of the cumulative effect of maintenance, as prescribed in the RM program, on the total sample.

Tables V-20 through V-24 give a summary of emissions levels, and fuel economies for just those vehicles that receive a particular test sequence. The object is to determine the effect of a certain action (or collection of actions) such as correction of a malperformance. To prevent the confounding of more than one effect, only those vehicles subject to a particular action are investigated prior to and after the action. Since every action is followed by a test, the effect of every action may be determined by comparing the condition of the vehicles prior to the test with the condition of the vehicles after the test.

Comparisons between tests 1 and 2 (Table V-20) determine the effect of correcting the maladjustments and disablements of emission components for the 113 vehicles taking test 2. Correction of malperformances has no effect on fuel economy, but emissions levels are reduced.

The comparisons given in Table V-21 illustrate the effect of adjusting the idle CO and idle RPM for the 75 vehicles taking only tests 1 and 3. These adjustments have no effect on fuel economy but significantly reduce HC and CO emissions. Similar results are illustrated in Table V-22 for the 68 test 3 vehicles that had other maladjustments or disablements corrected prior to test 3 (i.e., those vehicles that received tests 1, 2 and 3). NO_x emissions increase slightly in this latter case.

The comparisons given in Table V-24 illustrate the effect of a major tune-up and the repair of defective emission components on the 36 vehicles taking only test 1, 2 and 4. The results indicate no change in fuel economy and a reduction of emissions levels. Similar results are given in Table V-23 for the 72 vehicles that received tests 1, 3 and 4.

In summary, the results given in Tables V-20 through V-24 indicate that 1) very little change occurs in fuel economy following the three types of RM prescribed maintenance, 2) HC and CO emissions are reduced following each type of maintenance but the largest decrease results from idle CO and RPM adjustment, and 3) NO_x emissions are increased slightly following adjustment of idle mixture and idle speed but are decreased following the other maintenance procedures.

The cumulative effect of the maintenance procedures on the mean emissions and fuel economy of all the test vehicles is illustrated in Tables B-17 and B-18. The mean HC, CO and NO_x emissions are reduced from 1.32, 20.27 and 2.82 gm/mi to 0.87, 7.65 and 2.55 gm/mi due to the cumulative effects of the RM maintenance. The average urban fuel economy increases slightly from 13.7 mpg to 14.0 mpg due to the program maintenance. Again, the results in Tables B-17 and B-18 indicate that the largest decrease in HC and CO emissions results from the adjustment of idle CO and idle RPM.

Tables B-19 through B-34 present the mean emissions at each test sequence extrapolated to 50,000 miles for just those vehicles that received each test. These tables indicate the effect of deterioration on the mean emissions levels.

5.3 EFFECT OF SPECIFIC MALPERFORMANCES ON EMISSIONS AND FUEL ECONOMY (TESTS 5 - 10)

One of the purposes of the Restorative Maintenance Evaluation Project on the 1975 and 1976 model year vehicles was to investigate and quantify the individual and combined effects of maladjustments, disablements, and defects on exhaust emissions and fuel economy. This was to be accomplished by the sequential testing of vehicles after altering one or more operating parameters to simulate such occurrences. Originally, only vehicles which met the standards after undergoing the major tune-up would be eligible for this additional testing. In order to fill the sample, however, other vehicles which passed an earlier test were also used. The types of maladjustments and disablements employed for these sequences were selected during the design of the program. They were thought to represent typical actions that would be used to improve fuel economy, driveability, or both. Although most of these maladjustments and disablements were applied individually, 30 vehicles received a single test in which 3, 4 or 5 of these actions were combined. As would be expected, the FTP emission levels increased drastically. The average fuel economy change associated with this action, as well as each of the individual actions, was insignificant.

From the standpoint of percentage emission increases on the FTP, disablement of a vehicle's air pump produced the most dramatic results with HC and CO increases of 118% and 357%, respectively. Among the 103 vehicles equipped with air pumps, however, only one was found to have a disablement of this nature. Of more critical concern are the more common maladjustments of idle mixture and disablements of the EGR system. NO_x emissions more than doubled when the vacuum line to the EGR valve was plugged while HC and CO emissions increased by 85% and 211%, respectively, when the idle mixture was enriched, generally to achieve the "classic" lean best idle condition. Other induced problems resulted in smaller, but nonetheless significant, increases in the regulated emissions. Table V-1 lists the average emission and fuel economy results from this assessment.

A comparison between the mean emissions levels of test sequences 1 through 4 were made using the student t-test on the log transformed data. The results of these statistical tests will be discussed in the next section.

5.4 VEHICLES FAILING THE EMISSIONS STANDARDS FOR TEST SEQUENCES 1 THROUGH 4

Tables V-2 through V-11 present the percentage of vehicles failing any one of the three FTP standards and each individual emission standard for test sequences 1 through 4. The percent of failing vehicles given in these tables is presented in two ways: first, as the percent of the number of vehicles that received the given test (Tables V-2 through V-9) and, second, as the percent of the total 300 vehicles in the sample (Tables V-10 and V-11). The first type of percent failing is given as a function of 1) the 300 vehicles tested as-received, 2) the 113 vehicles that received maintenance due to some maladjustments or disablements on test 2, 3) the 143 vehicles that had adjusted idle mixture and speed prior to test 3, and 4) the 83 vehicles that received a tune up or repair of defective components on test 4. The majority of the vehicles failing Tests 1 and 2 fail because of high carbon monoxide emissions, and the majority of vehicles failing Tests 3 and 4 fail because of high NO_x emissions.

Tables V-10 and V-11 give the percent of the total sample of vehicles that still fail the FTP standards following the maintenance at each test sequence. These tables show the cumulative effect of restorative maintenance, as prescribed in the RM program, on the FTP failure rate. Fifty-eight percent of the 300 vehicles fail standards in their as-received condition. The failure rate for these 300 cars falls to 51% following correction of maladjustments and disablements (except idle CO and idle RPM adjustment), to 27% following idle CO and idle RPM adjustment, and to 18.7% following emission component repair and tune-up. Again, it is apparent that the largest HC and CO reduction follows adjustment of idle CO and idle RPM (test 3 results).

Tables V-12 through V-19 present the percent failing FTP standards at each test sequence extrapolated to 50,000 miles for just those vehicles that receive the specified test. The effect of deterioration on the failure rate can be estimated by comparing Tables V-12 through V-19 to Tables V-2 through V-9.

TABLE V-1 PERCENT CHANGE IN EMISSION/FUEL ECONOMY FROM A PASSED STANDARDS TEST TO TEST FOLLOWING INDICATED TYPE OF MALPERFORMANCE

MALPERFORMANCE TYPE	NUMBER TESTED FOR ESTIMATE	HC	CO	NO_x	URBAN FE	HWY FE
SELECTIVE MALPERFORMANCE	30	86	230	175	0	1
+5° TIMING	36	24	6	19	2	1
ENRICHED ICO	21	85	211	-4	-2	1
FULL MANIFOLD VACUUM TO DIST.	14	36	29	11	0	-1
CHOKE 3NR	22	23	80	15	-2	-1
EGR LINE PLUGGED	37	21	71	123	1	1
CHOKE HEATER DISCONNECTED	12	30	127	-7	0	2
AIR PUMP DEACTIVATED	8	118	357	-9	1	1

TABLE V-2 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY CITY FOR TEST SEQUENCE 1

CITY	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
CHICAGO	100	27.0	37.0	26.0	56.0
DETROIT	100	31.0	37.0	22.0	51.0
WASHINGTON	100	30.0	42.0	38.0	68.0
TOTAL	300	29.3	38.7	28.7	58.3

*NO_x CORRECTED FOR HUMIDITY

TABLE V-3 PERCENT OF VEHICLE FAILING THE EMISSIONS STANDARDS BY MANUFACTURER FOR TEST SEQUENCE 1

MANUFACTURER	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
GENERAL MOTORS	102	19.6	31.4	24.5	50.0
FORD	99	10.1	16.2	29.3	42.4
CHRYSLER	99	58.6	68.7	32.3	82.8
TOTAL	300	29.3	38.7	28.7	58.3

*NO_x CORRECTED FOR HUMIDITY

TABLE V-4 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2

CITY	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
CHICAGO	35	17.1	28.6	25.7	51.4
DETROIT	40	42.5	47.5	10.0	55.0
WASHINGTON	38	44.7	57.9	36.8	89.5
TOTAL	113	35.4	45.1	23.9	65.5

*NO_x CORRECTED FOR HUMIDITY

TABLE V-5 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY MANUFACTURER FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2

MANUFACTURER	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
GENERAL MOTORS	36	30.6	38.9	22.2	58.3
FORD	30	16.7	20.0	43.3	56.7
CHRYSLER	47	51.1	66.0	12.8	76.6
TOTAL	113	35.4	45.1	23.9	65.5

*NO_x CORRECTED FOR HUMIDITY

TABLE V-6 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY CITY FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3

CITY	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
CHICAGO	42	14.3	14.3	28.6	47.6
DETROIT	41	24.4	9.8	29.3	46.3
WASHINGTON	60	15.0	21.7	36.7	58.3
TOTAL	143	17.5	16.1	32.2	51.7

*NO_x CORRECTED FOR HUMIDITY

TABLE V-7 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY MANUFACTURER FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3

MANUFACTURER	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
GENERAL MOTORS	42	4.8	9.5	35.7	45.2
FORD	32	18.8	12.5	56.2	65.6
CHRYSLER	69	24.6	21.7	18.8	49.3
TOTAL	143	17.5	16.1	32.2	51.7

*NO_x CORRECTED FOR HUMIDITY

TABLE V-8 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY CITY FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4

CITY	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
CHICAGO	24	20.8	25.0	33.3	62.5
DETROIT	17	35.3	11.8	52.9	76.5
WASHINGTON	42	9.5	8.4	47.6	66.7
TOTAL	83	18.1	18.1	44.6	67.5

*NO_x CORRECTED FOR HUMIDITY

TABLE V-9 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY MANUFACTURER FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4

MANUFACTURER	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
GENERAL MOTORS	17	5.9	17.6	58.8	70.6
FORD	30	16.7	6.7	63.3	70.0
CHRYSLER	36	25.0	27.8	22.2	63.9
TOTAL	83	18.1	18.1	44.6	67.5

*NO_x CORRECTED FOR HUMIDITY

TABLE V-10

PERCENT (CUMULATIVE) OF VEHICLES FAILING THE 1975/1976 FEDERAL STANDARDS BY TEST SEQUENCE* AND SITE

Site	N	HC	CO	NO_X	Any of HC, CO, NO_X
			Test 1		
CHICAGO	100	27.0	37.0	26.0	56.0
WASHINGTON	100	30.0	42.0	38.0	68.0
DETROIT	100	31.0	37.0	22.0	51.0
ALL	300	29.3	38.7	28.7	58.3
			Test 2		
CHICAGO	100	20.0	32.0	16.0	44.0
WASHINGTON	100	28.0	42.0	31.0	66.0
DETROIT	100	27.0	32.0	14.0	43.0
ALL	300	25.0	35.3	20.3	51.0
			Test 3		
CHICAGO	100	6.0	7.0	14.0	23.0
WASHINGTON	100	8.0	13.0	27.0	40.0
DETROIT	100	8.0	5.0	10.0	18.0
ALL	300	7.3	8.3	17.0	27.0
			Test 4		
CHICAGO	100	5.0	6.0	8.0	15.0
WASHINGTON	100	4.0	7.0	20.0	28.0
DETROIT	100	4.0	2.0	9.0	13.0
ALL	300	4.3	5.0	12.3	18.7

*TEST 1: AS-RECEIVED

TEST 2: AFTER CORRECTION OF MALADJUSTMENTS AND DISABLEMENTS (EXCEPT IDLE CO & IDLE RPM ADJUSTMENT)

TEST 3: AFTER IDLE CO AND IDLE RPM ARE RESET TO SPECIFICATIONS

TEST 4: AFTER EMISSION COMPONENT REPAIR AND MAJOR TUNE-UP

TABLE V-11

PERCENT (CUMULATIVE) OF VEHICLES FAILING THE 1975/1976 FEDERAL STANDARDS BY TEST SEQUENCE* AND MANUFACTURER

Test 1

Manufacturer	N	HC	CO	NO_X	Any of HC, CO, NO_X
GM	102	19.6	31.4	24.5	50.0
FORD	99	10.1	16.2	29.3	42.4
CHRYSLER	99	58.6	68.7	32.3	82.8
ALL	300	29.3	38.7	28.7	58.3
Test 2					
GM	102	16.7	27.5	18.6	42.2
FORD	99	8.1	15.2	27.3	39.4
CHRYSLER	99	50.5	63.6	15.2	71.7
ALL	300	25.0	35.3	20.3	51.0
Test 3					
GM	102	2.0	3.9	11.8	15.7
FORD	99	5.1	5.1	25.3	29.3
CHRYSLER	99	12.5	16.2	14.1	36.4
ALL	300	7.3	8.3	17.0	27.0
Test 4					
GM	102	1.0	2.9	9.8	11.8
FORD	99	3.0	2.0	19.2	21.2
CHRYSLER	99	9.1	10.1	8.1	23.2
ALL	300	4.3	5.0	12.3	18.7

*TEST 1:	AS-RECEIVED
TEST 2:	AFTER CORRECTION OF MALADJUSTMENTS AND DISABLEMENTS (EXCEPT IDLE CO & IDLE RPM ADJUSTMENT)
TEST 3:	AFTER IDLE CO AND IDLE RPM ARE RESET TO SPECIFICATIONS
TEST 4:	AFTER EMISSION COMPONENT REPAIR AND MAJOR TUNE-UP

TABLE V-12 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY CITY FOR TEST SEQUENCE 1 FOR EMISSIONS EXTRAPOLATED TO 50,000 MILES

CITY	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
CHICAGO	100	38.0	45.0	36.0	67.0
DETROIT	100	45.0	39.0	25.0	58.0
WASHINGTON	100	43.0	43.0	45.0	73.0
TOTAL	300	42.0	42.3	35.3	66.0

*NO_x CORRECTED FOR HUMIDITY

TABLE V-13 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY MANUFACTURER FOR TEST SEQUENCE 1 FOR EMISSIONS EXTRAPOLATED TO 50,000 MILES

MANUFACTURER	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
GENERAL MOTORS	102	28.4	33.3	34.3	57.8
FORD	99	25.2	22.2	32.3	52.5
CHRYSLER	99	72.7	71.7	39.4	87.9
TOTAL	300	42.0	42.3	35.3	66.0

*NO_x CORRECTED FOR HUMIDITY

TABLE V-14 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY CITY FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2 FOR EMISSIONS EXTRAPOLATED TO 50,000 MILES

CITY	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
CHICAGO	35	34.3	31.4	34.3	71.4
DETROIT	40	50.0	52.5	15.0	65.0
WASHINGTON	38	60.5	60.5	42.1	94.7
TOTAL	113	48.7	48.7	30.1	77.0

*NO_x CORRECTED FOR HUMIDITY

TABLE V-15 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY MANUFACTURER FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2 FOR EMISSIONS EXTRAPOLATED TO 50,000 MILES

MANUFACTURER	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
GENERAL MOTORS	36	41.7	41.7	33.3	72.2
FORD	30	23.3	20.0	43.3	60.0
CHRYSLER	47	70.2	72.3	19.2	91.5
TOTAL	113	48.7	48.7	30.1	77.0

*NO_x CORRECTED FOR HUMIDITY

TABLE V-16 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY CITY FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3 FOR EMISSIONS EXTRAPOLATED TO 50,000 MILES

CITY	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
CHICAGO	42	23.8	19.0	40.5	66.7
DETROIT	41	26.8	12.2	31.7	51.2
WASHINGTON	60	28.3	23.3	50.0	75.0
TOTAL	143	26.6	18.9	42.0	65.7

*NO_x CORRECTED FOR HUMIDITY

TABLE V-17 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY MANUFACTURER FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3 FOR EMISSIONS EXTRAPOLATED TO 50,000 MILES

MANUFACTURER	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
GENERAL MOTORS	42	7.1	9.5	45.2	54.8
FORD	32	34.4	15.6	62.5	81.2
CHRYSLER	69	34.8	26.1	30.4	65.2
TOTAL	143	26.6	18.9	42.0	65.7

*NO_x CORRECTED FOR HUMIDITY

TABLE V-18 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY CITY FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4 FOR EMISSIONS EXTRAPOLATED TO 50,000 MILES

CITY	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
CHICAGO	24	37.5	29.2	45.8	75.0
DETROIT	17	47.1	11.8	58.8	76.5
WASHINGTON	42	31.0	19.1	66.7	83.3
TOTAL	83	36.1	20.5	59.0	79.5

*NO_x CORRECTED FOR HUMIDITY

TABLE V-19 PERCENT OF VEHICLES FAILING THE EMISSIONS STANDARDS BY MANUFACTURER FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4 FOR EMISSIONS EXTRAPOLATED TO 50,000 MILES

MANUFACTURER	# CARS	FAILING HC STANDARD	FAILING CO STANDARD	FAILING NO_x* STANDARD	FAILING AT LEAST ONE STANDARD
GENERAL MOTORS	17	5.9	17.6	64.7	76.5
FORD	30	43.3	10.0	76.7	86.7
CHRYSLER	36	44.4	30.6	41.7	75.0
TOTAL	83	36.1	20.5	59.0	79.5

*NO_x CORRECTED FOR HUMIDITY

TABLE V-20 A COMPARISON OF EMISSIONS LEVEL AND URBAN AND HIGHWAY FUEL ECONOMIES BETWEEN TEST SEQUENCES 1 AND 2 FOR VEHICLES TAKING ONLY TESTS 1 AND 2

MANUFACTURER	NO. CARS	TEST SEQUENCE	HYDROCARBONS (gm/mi) ARITHMETIC		CARBON MONOXIDE (gm/mi) ARITHMETIC		NO_X* (gm/mi) ARITHMETIC		URBAN FUEL ECONOMY (mi/gal) HARMONIC		HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC	
			MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
GENERAL MOTORS	36	BEFORE TEST 2	1.34	1.20	25.42	30.86	3.18	1.78	13.37	2.04	19.09	2.68
		AFTER TEST 2	1.21	0.98	21.67	25.79	2.63	0.74	13.37	1.43	19.13	2.58
FORD	30	BEFORE TEST 2	1.21	0.80	12.87	15.12	3.01	1.34	13.28	2.65	18.59	3.54
		AFTER TEST 2	1.13	0.64	10.26	13.19	3.00	1.11	13.65	1.89	19.01	3.20
CHRYSLER	47	BEFORE TEST 2	2.20	1.16	39.65	24.64	3.34	1.61	13.69	2.41	19.99	2.73
		AFTER TEST 2	1.92	1.14	32.63	25.71	2.60	0.48	13.54	2.23	19.85	2.88
TOTAL	113	BEFORE TEST 2	1.66	1.17	28.01	26.95	3.20	1.59	13.47	2.36	19.32	3.02
		AFTER TEST 2	1.48	1.04	23.20	24.64	2.72	0.78	13.52	1.90	19.39	2.88

*NO_X corrected for humidity

TABLE V-21 A COMPARISON OF EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMIES BETWEEN TEST SEQUENCES 1 AND 3 FOR VEHICLES TAKING ONLY TESTS 1 AND 3

MANUFACTURER	NO. CARS	TEST SEQUENCE	HYDROCARBONS (gm/mi) ARITHMETIC		CARBON MONOXIDE (gm/mi) ARITHMETIC		NO_X* (gm/mi) ARITHMETIC		URBAN FUEL ECONOMY (mi/gal) HARMONIC		HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC	
			MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
GENERAL MOTORS	22	BEFORE TEST 3	1.29	0.80	23.90	20.23	2.89	0.72	13.68	2.63	19.15	3.62
		AFTER TEST 3	0.66	0.41	8.32	8.00	2.74	0.69	14.13	2.78	19.17	3.72
FORD	19	BEFORE TEST 3	1.20	0.57	14.73	11.54	3.40	1.38	12.43	1.58	17.59	2.23
		AFTER TEST 3	1.16	0.46	7.41	4.88	3.92	2.41	12.79	1.85	17.90	2.36
CHRYSLER	34	BEFORE TEST 3	2.20	0.97	40.56	24.70	2.77	1.24	14.25	2.52	20.51	2.74
		AFTER TEST 3	1.34	0.98	13.76	18.51	2.86	1.27	14.96	2.67	20.62	2.87
TOTAL	75	BEFORE TEST 3	1.68	0.95	29.13	23.28	2.96	1.17	13.58	2.39	19.30	3.12
		AFTER TEST 3	1.10	0.78	10.56	13.62	3.10	1.59	14.11	2.60	19.44	3.20

*NO_X corrected for humidity

TABLE V-22 A COMPARISON OF EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMIES BETWEEN TEST SEQUENCES 2 AND 3 FOR VEHICLES TAKING ONLY TESTS 1, 2 & 3

MANUFACTURER	NO. CARS	TEST SEQUENCE	HYDROCARBONS (gm/mi) ARITHMETIC		CARBON MONOXIDE (gm/mi) ARITHMETIC		NO_X* (gm/mi) ARITHMETIC		URBAN FUEL ECONOMY (mi/gal) HARMONIC		HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC	
			MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
GENERAL MOTORS	20	BEFORE TEST 3	1.56	1.11	32.93	29.70	2.70	0.91	13.10	1.53	19.56	2.70
		AFTER TEST 3	0.64	0.37	8.21	10.25	2.69	0.78	14.18	2.15	19.97	2.65
FORD	13	BEFORE TEST 3	1.50	0.79	17.74	17.49	3.55	1.09	13.56	1.29	19.00	2.02
		AFTER TEST 3	1.16	0.56	8.20	7.22	3.82	1.99	13.61	1.43	18.94	2.10
CHRYSLER	35	BEFORE TEST 3	2.23	1.15	40.89	24.80	2.50	0.47	13.46	2.26	19.79	3.01
		AFTER TEST 3	1.16	0.70	11.56	6.09	2.56	0.43	14.10	2.76	20.22	2.95
TOTAL	68	BEFORE TEST 3	1.89	1.12	34.12	26.33	2.76	0.85	13.37	1.88	19.56	2.72
		AFTER TEST 3	1.01	0.63	9.93	7.80	2.84	1.10	14.03	2.35	19.89	2.70

*NO_X corrected for humidity

TABLE V-23 A COMPARISON OF EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMIES BETWEEN TEST SEQUENCES 3 AND 4 FOR VEHICLES TAKING ONLY TESTS 1, 3 & 4

MANUFACTURER	NO. CARS	TEST SEQUENCE	HYDROCARBONS (gm/mi) ARITHMETIC		CARBON MONOXIDE (gm/mi) ARITHMETIC		NO_X* (gm/mi) ARITHMETIC		URBAN FUEL ECONOMY (mi/gal) HARMONIC		HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC	
			MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
GENERAL MOTORS	16	BEFORE TEST 4	0.81	0.56	12.39	13.16	3.17	0.87	13.58	2.68	19.10	3.49
		AFTER TEST 4	0.70	0.39	11.24	12.50	3.16	0.92	13.48	2.54	18.84	3.38
FORD	22	BEFORE TEST 4	1.29	0.51	8.60	6.43	4.58	2.32	13.46	1.40	19.10	1.68
		AFTER TEST 4	1.22	0.36	7.86	4.07	3.32	0.79	13.20	1.52	18.65	2.09
CHRYSLER	34	BEFORE TEST 4	1.66	1.02	17.29	18.12	2.86	1.30	14.32	2.79	20.14	2.85
		AFTER TEST 4	1.47	0.96	14.98	15.04	2.61	0.72	13.77	2.24	19.85	2.48
TOTAL	72	BEFORE TEST 4	1.36	0.86	13.55	14.70	3.45	1.77	13.88	2.38	19.87	2.72
		AFTER TEST 4	1.22	0.77	11.98	12.36	2.95	0.84	13.53	2.09	19.24	2.63

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*NO_X corrected for humidity

TABLE V-24 COMPARISON OF EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMIES BETWEEN TEST SEQUENCES 2 AND 4 FOR VEHICLES TAKING ONLY TESTS 1, 2 & 4

MANUFACTURER	NO. CARS	TEST SEQUENCE	HYDROCARBONS (gm/mi) ARITHMETIC		CARBON MONOXIDE (gm/mi) ARITHMETIC		NO_X* (gm/mi) ARITHMETIC		FUEL URBAN ECONOMY (mi/gal) HARMONIC		HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC	
			MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
GENERAL MOTORS	8	BEFORE TEST 4	0.91	0.91	20.67	39.38	3.43	0.92	13.68	2.10	19.91	2.20
		AFTER TEST 4	0.70	0.48	11.73	17.68	3.28	1.12	13.80	1.99	19.24	2.39
FORD	4	BEFORE TEST 4	1.48	0.74	16.55	17.09	3.88	0.82	13.46	2.04	19.50	2.88
		AFTER TEST 4	1.16	0.37	7.08	4.16	3.50	0.96	13.75	2.07	19.19	3.05
CHRYSLER	14	BEFORE TEST 4	2.35	1.50	40.60	32.10	2.64	0.69	13.23	2.16	19.56	2.22
		AFTER TEST 4	1.34	0.92	14.21	8.18	2.59	0.49	13.50	2.70	19.49	2.46
TOTAL	36	BEFORE TEST 4	1.69	1.24	26.82	30.47	3.30	0.95	13.42	2.05	19.61	2.44
		AFTER TEST 4	1.13	0.68	10.88	10.20	3.09	0.93	13.66	2.27	19.32	2.63

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*NO_X corrected for humidity

6.0 VEHICLE DRIVEABILITY

It may be inferred from the results of both Sections 4 and 5 that low emissions could be obtained by an appropriate limitation of idle CO, idle RPM, timing, etc. Whereas the choice of a limit or specification that produces the lowest emissions might be possible, this choice might impair the overall performance quality or driveability of a vehicle. Choice of an appropriate specification for a vehicle may be a compromise between lowest emissions and best driveability.

The question then arises as to how good is a certain choice for a specification. If a vehicle is within manufacturers specifications will the vehicle both meet standards and perform well (i.e., no stalling, stumbling, dieseling, etc.)? Section 4 already explored the effect upon emissions as the deviation from the specification increased. The results for idle CO indicated clearly that HC and CO emissions increased as the deviation from the specification increased. The results for idle RPM and timing, however, showed no particular trend. This section will investigate possible correlations between high emissions, poor driveability and specification tolerances.

6.1 DRIVEABILITY AND DEVIATION FROM .5% IDLE CO, OR TIMING, IDLE RPM SPECIFICATIONS

Information provided by the owner as to engine performance, warranty, and maintenance was obtained for every vehicle in the testing sample. The answers to the question on vehicle warranty indicate that of the 300 vehicles in the sample 250 were returned at least one time for warranty repairs. Figure 6-1 shows the frequency of warranty action taken for each of the 300 vehicles. Vehicles returned for warranty action deviate from .5% idle CO as much or more than vehicles never returned.

Figures 6-2 through 6-5 present the deviation from the timing specification for only those 100 vehicles which had previously been returned for the correction of a driveability problem. These 100 vehicles had been returned for the correction of such problems as engine misfire, poor acceleration, dieseling and others. Most of the 100 vehicles no longer have

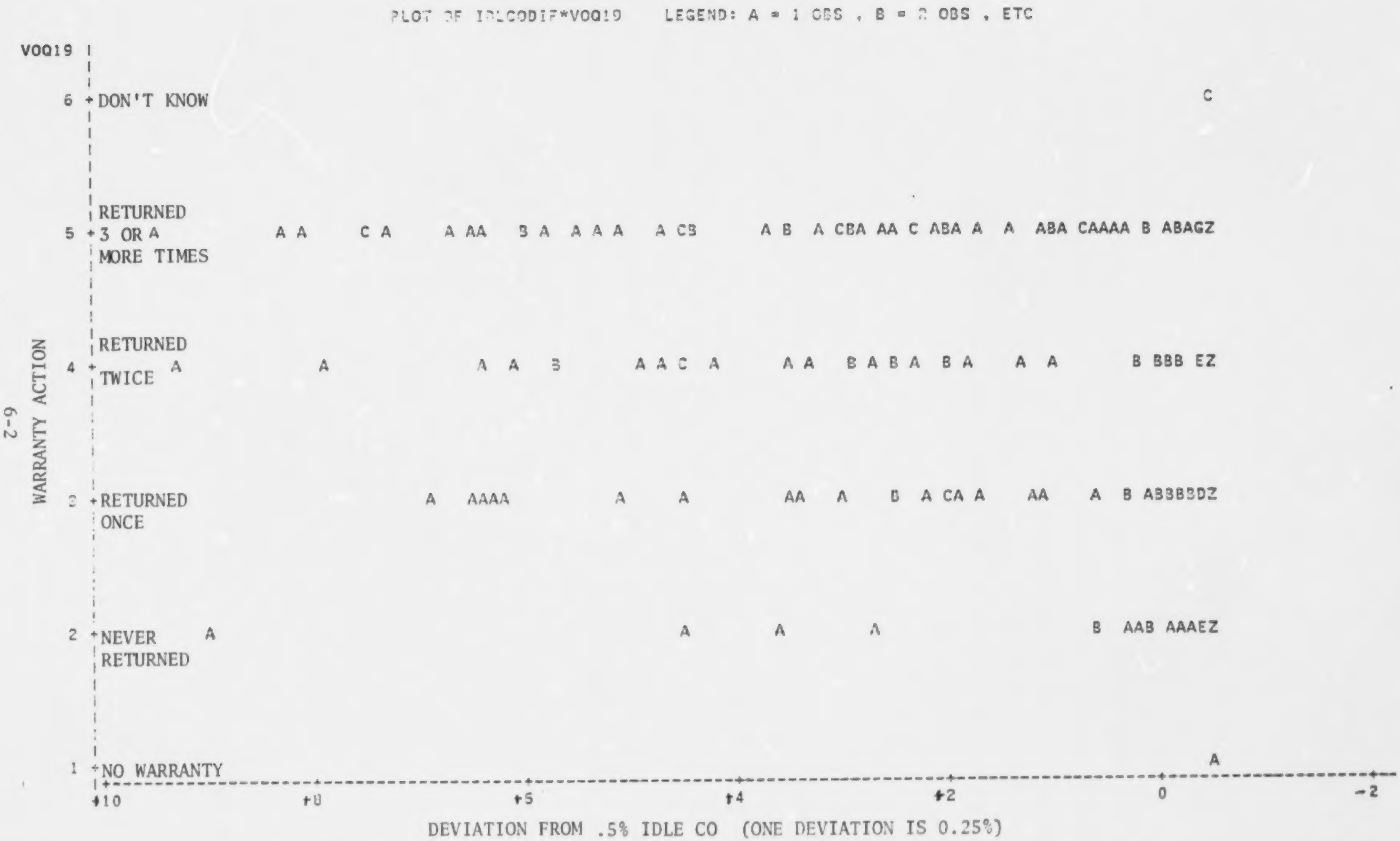

Figure 6-1 WARRANTY ACTION AS FUNCTION OF DEVIATION FROM IDLE CO SPECIFICATION

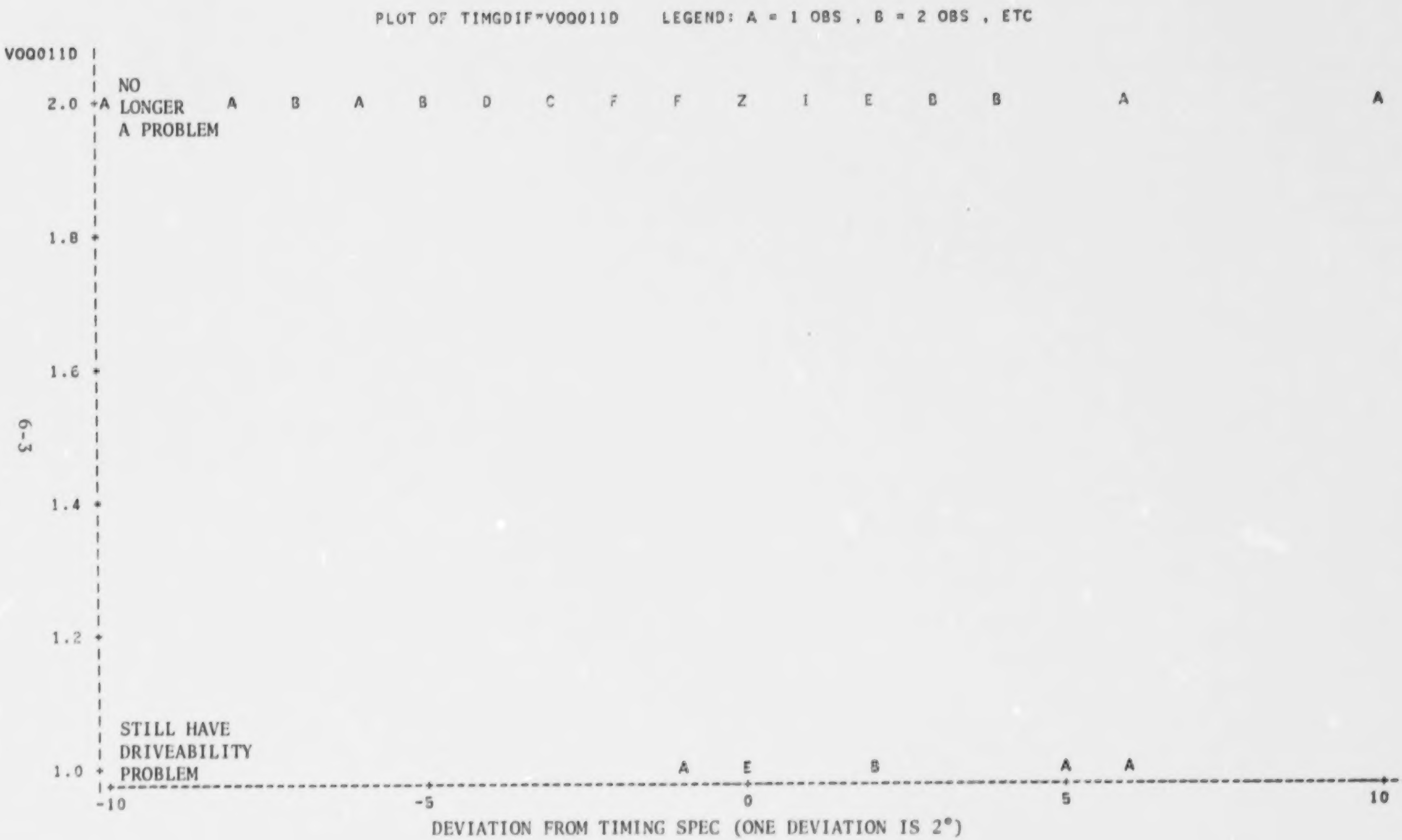

Figure 6-2 DEVIATION FROM TIMING SPEC FOR VEHICLES RETURNED FOR CORRECTION OF ENGINE MISFIRE

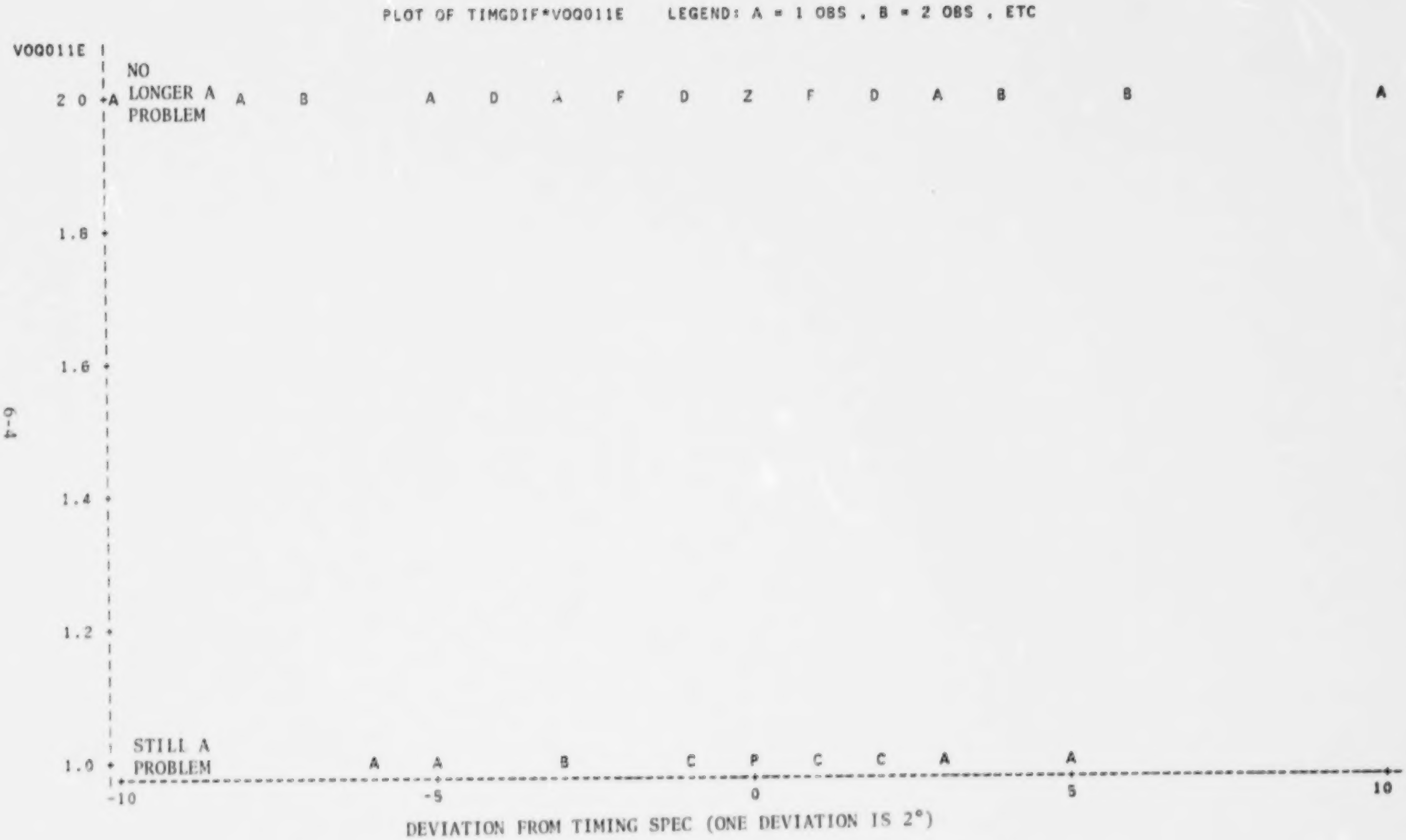

Figure 6-3 DEVIATION FROM TIMING SPEC FOR VEHICLES RETURNED FOR CORRECTION OF POOR ACCELERATION

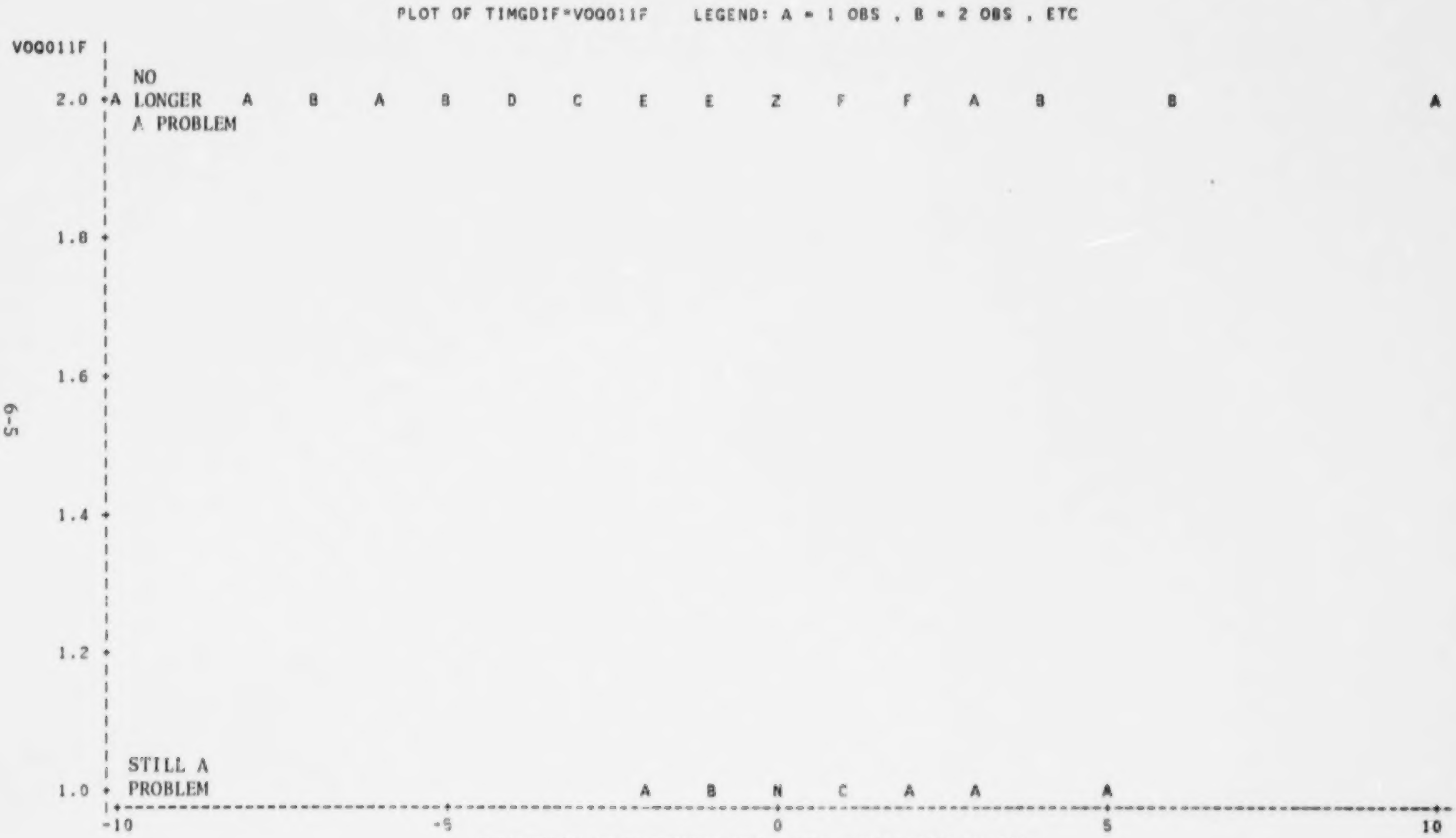

Figure 6-4 DEVIATION FROM TIMING SPEC FOR VEHICLES RETURNED FOR CORRECTION OF STUMBLING PROBLEM

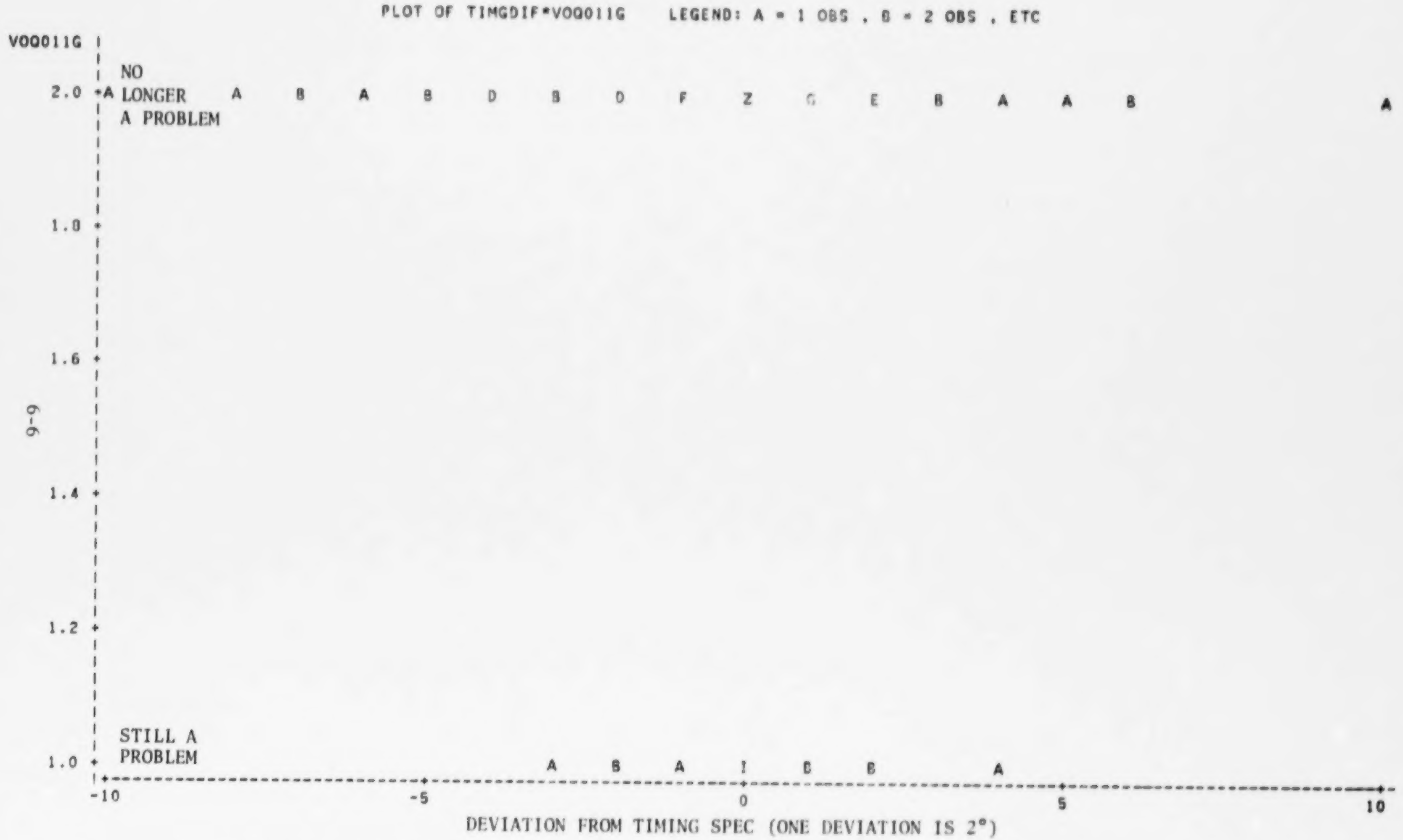

Figure 6-5 DEVIATION FROM TIMING SPEC FOR VEHICLES RETURNED FOR CORRECTION OF DIESELING PROBLEM

owner-perceived driveability problems. In most cases, the vehicles with corrected driveability problems are farther from specifications than vehicles still having driveability problems. Since the condition of the vehicle (degree to which it deviated from the specification) before its return for correction of the driveability problem is not known, nothing can be said as to how the driveability problem was corrected (i.e., timing moved closer to specification or farther from specification). It is evident, however, that good driveability does not necessarily correspond to a condition in which the vehicle is within the timing specification.

The same conclusion as that given above was reached when deviations from .5% idle CO and the idle RPM specifications were investigated. The deviation from the timing specification was presented as representative of results observed for other specifications.

6.2 OWNER-PERCEIVED DRIVEABILITY PROBLEMS

Tables VI-1 through VI-7 show the percentage of vehicles with owner-perceived driveability problems such as hard-starting, misfire, poor acceleration, etc. Several of the different types of driveability problems occur with almost equal frequency. Hard-starting, stalling, rough idling, poor acceleration, stumbling, and dieseling problems occur between 13% and 19% of all the vehicles tested. Misfiring and other problems occur for only 5-6% of all vehicles. However, 66% of all vehicles have at least one driveability problem, which implies that the problems as indicated by the owners are restricted to one or two problems which are not common from owner to owner.

Investigation of the owner-perceived driveability problems by manufacturer as in Table VI-2 indicates that driveability problems are not manufacturer-related although Chrysler vehicles have a slightly higher rate of hard-starting and stalling problems than Ford or General Motors. Seventy-eight percent of all the Chrysler owners indicated that they had at least one driveability problem as compared to 56% of the General Motors owners and 65% of the Ford owners.

Tables VI-3 through VI-6 present the frequency of each owner-perceived driveability problem for vehicles passing the initial test and for vehicles failing the initial test. There is no difference in the frequency of each type of problem between vehicles passing the initial test and vehicles failing the initial test.

Table VI-7 provides a breakdown of driveability problems by cubic inch displacement (CID). The CID categories presented are certainly not the most specific categories possible but the categories roughly correspond to 4, 6, and 8 cylinder vehicles. The frequencies of driveability problems do not necessarily have a functional relationship with CID; however, the mid-size engine category (150-259 CID) have the highest rates of owner-perceived problems for most of the driveability problems listed.

6.3 CONTRACTOR-PERCEIVED DRIVEABILITY PROBLEMS

A simple driveability test was performed by the testing contractor on each RM vehicle at each test sequence. There was a separate contractor for each of the three test cities or locations. Whereas the owner of the vehicle tested could answer only yes, no, or most of the time to the question of whether he was overall reasonably satisfied with the engine performance of his vehicle, each contractor could specify the idle, acceleration and cruise quality of each vehicle as either excellent, good, fair, poor, or fail. The contractor definitions of these quality indicators are:

Excellent - No trace of undesirable elements (smooth, even, responsive)

Good - Slight trace, small indication of an undesirable element (initial unevenness, roughness, hesitation, quickly overcome)

Fair - Undesirable element exists yet reliability is maintained. (Only intermittent misfire, surging, hesitation)

Poor - Undesirable elements exist which affect reliability or driver confidence (steady misfire, roughness, lack of power, lack of response)

Fail - Extremely unreliable, possible unsafe conditions exist (frequent stalling, die-outs on acceleration, lack of throttle response)

The owner driveability evaluation differs from the contractor evaluation in two respects: 1) the owner was limited to a yes, no, or most of the time response to whether he was overall reasonably satisfied with his vehicle's engine performance, and 2) the owner evaluation probably included more extreme conditions (e.g., temperature, type of driving, etc.) than the contractor evaluation.

The contractor evaluated the vehicle quality for each segment of each of five driving phases. The segments and the corresponding driving phases used in the contractor evaluation are:

- Constant Speed Phase
    - Acceleration quality
    - Cruise quality
    - Slight acceleration response (passing)
    - Idle quality at stop - w/air "on"
      w/air "off"

- Acceleration from Stop Phase
    - Quality of acceleration under 1/4 throttle
    - Quality of acceleration under 1/2 throttle
    - Quality of acceleration under 2/3 throttle
    - Quality of acceleration under 3/4 throttle

- Re-start Phase
    - Idle quality after re-start

- Cold Start and Idle Phase (Dynamometer)
    - Idle quality

- Drive-away Phase (Dynamometer)
    - Acceleration quality
    - Idle quality after 0.2 mile @stop
    - Acceleration quality
    - Idle quality after 0.4 mile @ stop

An overall contractor quality of a vehicle is defined by the authors to be the rounded average of the qualities for each segment of each of the five driving phases. A comparison between the owner-perceived and contractor-perceived driveability of a vehicle can now be made where a yes response by the owner is considered equivalent to good or excellent quality by the contractor. A fair response by the contractor is considered equivalent to the owner being satisfied with the vehicle performance most of the time and a poor or fail contractor quality rating is considered equivalent to the owner being unsatisfied with the vehicle's driveability. Results of the comparison show that in one instance the owner was unsatisfied with his Ford that the contractor rated as excellent. In 23 instances the owner rated as unsatisfactory the vehicles that the contractor rated as good. In 26 cases, the owner was satisfied with the driveability of vehicles that the contractor rated as fair. In one case, the owner rated as satisfactory his Chrysler vehicle that was rated as poor by the contractor. Considering the extent to which quality is subjective, owner-perceived quality agrees well with contractor-perceived quality.

The percent of vehicles, in as-received condition, in each driveability quality category is given by driving phase in Tables VI-8 through VI-13. Each driving phase presented is composed of two or more driving segments. Each driving segment is rated by the contractor as to quality. The percent of vehicles in each driving quality category for each driving phase is obtained by averaging the particular quality over all the segments and rounding. For example, Table VI-8 shows that most of the vehicles have good quality (code 4) during the constant speed phase of the test. The constant speed phase, however, is composed of five segments each of which are assigned a quality by the contractor. The driveability quality of any vehicle for the constant speed phase is the rounded average of its driveability qualities for each segment at that phase. The overall driveability quality is determined by calculating the rounded average of each of the segment qualities in each of the driving phases. Because of the rounding procedure used to determine overall driveability quality, and because a code of 1, a fail, occurs so infrequently, overall quality codes range between 2 and 5.

Results show that 69% of all vehicles in all cities demonstrate good overall driveability quality. Ninety-eight percent of all vehicles have fair, good, or excellent driveability quality. Sixty-six percent of all Chrysler vehicles have good driveability as compared to 71% for GM and 72% for Ford. Ninety-four percent of all GM vehicles have good or excellent driveability. Seventy-five percent of all Chrysler vehicles have good or excellent driveability and 83% of all Ford vehicles have good or excellent driveability.

Tables VI-10 through VI-13 present the percent of vehicles with each type of quality for vehicles passing the initial test and for vehicles failing the initial test. Results indicate that 66% of all vehicles passing the initial test have good overall quality whereas 71% of all vehicles failing the initial test have good overall quality. The results seem to indicate that over all test vehicles no correlation exists between driveability and the failure of a vehicle in as-received condition to meet emissions standards. There is some indication that Chrysler vehicles that pass the standards in their as-received condition have worse driveability quality than do failing Chrysler vehicles.

The only consistent result observed for each driving phase is that the percentage of good driveability quality vehicles is always less for the drive away phase as compared to all other phases.

Finally, the most significant results of the investigation of contractor driveability quality are presented in Tables VI-14 through VI-21 where driveability quality is presented for each manufacturer by cubic inch displacement for each of the five driving phases and for the overall driveability quality. Examination of these tables shows that the majority of GM and Ford vehicles greater than 260 cubic inch displacement have a good to excellent driveability quality whereas the majority of GM and Ford vehicles less than 260 cubic inch displacement have a fair to good driveability quality. Keep in mind that the majority of Ford and GM vehicles are 351 and 350 CID and this fact biases the distribution. Nevertheless, even if the CID category "greater than 310" were deleted to make the CID distributions more equivalent vehicles with small displacement would still tend towards fair quality and vehicles with large displacement would tend towards good quality. There is no obvious difference in driveability quality for different displacement Chrysler vehicles.

6.4 A COMPARISON BETWEEN PAIRS OF TEST SEQUENCES

Tables VI-22 and VI-23 compared contractor driveability quality, emissions levels, and fuel economies for pairs of test sequences. The object is to determine the effect of a certain action such as correction of a malperformance. To prevent the confounding of more than one effect, only those vehicles subject to a particular action are investigated prior to and after the action. Since every action is followed by a test, the effect of every action may be determined by comparing the condition of the vehicles prior to the test with the condition of the vehicles after the test.

Comparisons between tests 1 and 2 determine the effect of correcting the maladjustments and disablements of emission components for the 113 vehicles taking test 2. Correction of these malperformances has no effect on contractor driveability quality, as shown in Table VI-22.

The comparisons between tests 1 and 3 illustrate the effect of adjusting the idle CO and idle RPM for the 75 vehicles taking only tests 1 and 3. These adjustments seem to slightly reduce driveability quality.

The comparisons between tests 2 and 3 illustrate the effect of adjusting the idle CO and idle RPM for the 68 vehicles taking only tests 1, 2 and 3. These adjustments for the 68 vehicles indicate that driveability quality remains the same.

The comparisons between tests 2 and 4 illustrate the effect of a major tune-up and emission component repair on the 36 vehicles taking only tests 1, 2 and 4. The results indicate no change in driveability quality following this maintenance.

The comparisons between tests 3 and 4 illustrate the effect of a major tune-up on the 72 vehicles taking only tests 1, 3 and 4. There is no change indicated in driveability quality following tune-up and repair of defective components.

Vehicles taking tests 5 through 10 are subject to "selective maladjustment." Each vehicle prior to one of the tests 5 through 10 is maladjusted by altering some combination of engine parameters. For instance, the EGR line is intentionally plugged, the idle mixture enriched, the timing advanced, and/or the vacuum to the distributor fully advanced. All of these actions may be taken on a selected group of vehicles at test sequence 5 or individually in 6 through 10.

The results of these intentional maladjustments show that driveability quality is not affected for vehicles taking only tests 4 and 5, 4 and 6, 4 and 7, 4 and 8, 4 and 9, and 4 and 10. In every instance, the effect of the maladjustment between test 4 and every succeeding test is to increase HC, CO and NO_x emissions. The selected maladjustments, however, do not affect fuel economy.

Since no particular maladjustment was made for each vehicle within the testing group, it is difficult to say anything more about the effect on emissions, fuel economy and driveability. Many factors, such as engineering design, enter into the problem of assessing the impact of a maladjustment. For instance, a plugged EGR line could seriously degrade the performance of one vehicle and have no effect on the performance of a different vehicle. The cumulative effect of several disablements or maladjustments was in some cases different than the combined effect of the individual disablements or maladjustments. Whereas, it is conjectured that the cumulative effect of several maladjustments would not decrease emissions, the relationship of every maladjustment and combination of maladjustments with emissions is not known.

6.5 A COMPARISON OF IDLE CO AND IDLE RPM BEFORE AND AFTER ADJUSTMENT

Table VI-24 presents the percent change in emissions, driveability quality, and fuel economy for each of the 143 vehicles taking tests 1 and 3. Figure 5-1 in Section 5 shows that the 143 vehicles outside of specifications prior to test 3 were adjusted to be within idle mixture and idle RPM specifications. Following this procedure, the 143 vehicles took test 3 and 74 vehicles failed the FTP standards.

The following variable names are used in Tables VI-24 through 27 and are defined as:

DIDLCO - the percent difference in idle CO from test 1 to 3

DRPM - the percent difference in idle RPM from test 1 to 3

DQUAL - the percent difference in overall driveability quality from test 1 to 3

DIQLTY - the percent difference in idle quality from test 1 to 3

T1 - the vehicle took test 1 but failed (T) or took test 1 and passed (P)

TT3 - the vehicle took test 3 and failed (T) or took test 3 and passed (P)

DFTPHC - the percent difference in HC emissions from test 1 to 3

DFTPCO - the percent difference in CO emissions from test 1 to 3

DFTPNX - the percent difference in NOX emissions from test 1 to 3

DFTPMPG - the percent difference in urban fuel economy from test 1 to 3

Two different tests, in this case tests 1 and 3, are applied to the same sampling of 143 vehicles. The probability of disclosing a difference between the conditions at tests 1 and 3 when one actually exists is greater if, in place of the difference between the means of tests 1 and 3, one mean calculated from the sum of the pair differences is tested. In statistical terms, this test is equivalent to a paired t test. The percent difference presented in Table VI-24 is the difference of test 1 minus test 2 all divided by test 1 times 100%. The percent difference is presented for each of the 143 vehicles. The mean percent difference is then presented in Table VI-25 by manufacturer. Three vehicles, vehicle numbers (VEHNUM) 38, 74 and 15, are deleted as outliers from the calculation of the mean percent differences.

Table VI-25 shows that the largest percent changes are those for CO and idle CO. The percent changes in idle RPM and fuel economy are not significant. The percent change in HC levels is large for GM and Chrysler vehicles but not for Ford vehicles. The percent change in NOX levels, however, is significant for Ford but not for GM or Chrysler.

Tables VI-26 and VI-27 show that the overall driveability quality decreases somewhat from test 1 to test 3 and the idle quality remains about the same. The percent of vehicles in the overall excellent (code 5) driveability quality category decreases from test 1 to 3 and the percent of vehicles in the overall fair quality category increases from test 1 to 3.

TABLE VI-1

PERCENTAGE OF VEHICLES WITH OWNER-PERCEIVED DRIVEABILITY PROBLEMS

		DRIVEABILITY PROBLEMS								
CITY	NO. CARS	HARD-START	STALL-ING	ROUGH IDLE	MISFIRE	POOR ACCEL	STUMB-LING	DIESELING	OTHER	AT LEAST ONE PROBLEM
CHICAGO	100	21.00	18.00	15.00	1.00	23.00	15.00	17.00	12.00	77.00
DETROIT	100	13.00	19.00	12.00	11.00	14.00	12.00	14.00	4.00	53.00
WASHINGTON	100	6.00	21.00	19.00	3.00	20.00	23.00	19.00	1.00	68.00
TOTAL	300	13.33	19.33	15.33	5.00	19.00	16.67	16.67	5.67	66.00

TABLE VI-2

PERCENTAGE OF VEHICLES WITH OWNER-PERCEIVED
DRIVEABILITY PROBLEMS

		DRIVEABILITY PROBLEMS								
MANU-FACTURER	NO. CARS	HARD-START	STALL-ING	ROUGH IDLE	MISFIRE	POOR ACCEL	STUMB-LING	DIESELING	OTHER	AT LEAST ONE PROBLEM
GM	102	9.80	11.76	12.75	3.92	16.67	14.71	7.84	9.80	55.88
FORD	99	6.06	16.16	11.11	4.04	13.13	11.11	23.23	2.02	64.65
CHRYSLER	99	24.24	30.30	22.22	7.07	27.27	24.24	19.19	5.05	77.78
TOTAL	300	13.33	19.33	15.33	5.00	19.00	16.67	16.67	5.67	66.00

TABLE VI-3

PERCENTAGE OF VEHICLES WITH OWNER-PERCEIVED DRIVEABILITY PROBLEMS FOR ALL VEHICLES PASSING THE INITIAL TEST

		DRIVEABILITY PROBLEMS								
CITY	NO. CARS	HARD-START	STALLING	ROUGH IDLE	MISFIRE	POOR ACCEL	STUMB-LING	DIESELING	OTHER	AT LEAST ONE PROBLEM
CHICAGO	44	22.73	25.00	15.91	0.00	25.00	15.91	15.91	9.09	75.00
DETROIT	49	10.20	10.20	6.12	10.20	10.20	8.16	12.24	4.08	48.98
WASHINGTON	32	9.38	25.00	12.50	3.13	15.63	15.63	18.75	0.00	65.63
TOTAL	125	14.40	19.20	11.20	4.80	16.80	12.80	15.20	4.80	62.40

TABLE VI-4

PERCENTAGE OF VEHICLES WITH OWNER-PERCEIVED DRIVEABILITY PROBLEMS FOR ALL VEHICLES PASSING THE INITIAL TEST

		DRIVEABILITY PROBLEMS								
MANU-FACTURER	NO. CARS	HARD-STARTING	STALLING	ROUGH IDLE	MISFIRE	POOR ACCEL	STUMB-LING	DIESELING	OTHER	AT LEAST ONE PROBLEM
GM	51	15.69	17.65	7.84	3.92	17.65	11.76	9.80	5.88	56.86
FORD	57	7.02	17.54	10.53	5.26	10.53	12.28	22.81	3.51	61.40
CHRYSLER	17	35.29	29.41	23.53	5.88	35.29	17.65	5.88	5.88	82.35
TOTAL	125	14.40	19.20	11.20	4.80	16.80	12.80	15.20	4.80	62.40

TABLE VI-5

PERCENTAGE OF VEHICLES WITH OWNER-PERCEIVED DRIVEABILITY PROBLEMS FOR ALL VEHICLES FAILING THE INITIAL TEST

		DRIVEABILITY PROBLEMS								
CITY	NO. CARS	HARD-START	STALLING	ROUGH IDLE	MISFIRE	POOR ACCEL	STUMB-LING	DIESELING	OTHER	AT LEAST ONE PROBLEM
CHICAGO	56	19.64	12.50	14.29	1.79	21.43	14.29	17.86	14.29	78.57
DETROIT	51	15.69	27.45	17.65	11.76	17.65	15.69	15.69	3.92	56.86
WASHINGTON	68	4.41	19.12	22.06	2.94	22.06	26.47	19.12	1.47	69.12
TOTAL	175	12.57	19.43	18.29	5.14	20.57	19.43	17.71	6.29	68.57

TABLE VI-6

PERCENTAGE OF VEHICLES WITH OWNER-PERCEIVED DRIVEABILITY PROBLEMS FOR ALL VEHICLES FAILING THE INITIAL TEST

CITY	NO. CARS	HARD-START	STALLING	ROUGH IDLE	MISFIRE	POOR ACCEL	STUMB-LING	DIESELING	OTHER	AT LEAST ONE PROBLEM
GM	51	3.92	5.88	17.65	3.92	15.69	17.65	5.88	13.73	54.90
FORD	42	4.76	14.29	11.90	2.38	16.67	9.52	23.81	0.00	69.05
CHRYSLER	82	21.95	30.49	21.95	7.32	25.61	25.61	21.95	4.88	76.83
TOTAL	175	12.57	19.43	18.29	5.14	20.57	19.43	17.71	6.29	68.57

TABLE VI-7 PERCENTAGE OF VEHICLES WITH OWNER-PERCEIVED DRIVEABILITY PROBLEMS BY CUBIC INCH DISPLACEMENT

		DRIVEABILITY PROBLEMS								
CUBIC INCH DISPLACEMENT	NO. CARS	HARD START	STALLING	ROUGH IDLE	MISFIRE	POOR ACCEL-ERATION	STUMBLING	DIESELING	OTHER	AT LEAST ONE PROBLEM
LESS THAN OR EQUAL TO 150	17	11.76	11.76	11.76	0.00	5.88	11.76	0.00	0.00	47.06
GREATER THAN 150 AND LESS THAN OR EQUAL TO 259	72	22.22	30.56	16.67	5.56	22.22	22.22	25.00	2.78	75.00
GREATER THAN 259	211	10.43	16.11	15.17	5.21	18.96	15.17	15.17	7.11	64.45

TABLE VI-8 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES FOR EACH DRIVING PHASE BY CITY, AS-RECEIVED CONDITION

CITY	# CARS	DRIVING PHASE										OVERALL DRIVEABILITY QUALITY	
		CONSTANT SPEED PHASE QUALITY		ACCELERATION FROM STOP PHASE QUALITY		RESTART PHASE QUALITY		COLD START AND IDLE PHASE QUALITY		DRIVE AWAY PHASE QUALITY			
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	100	2	1.0	2	1.0	2	0.0	1	0.0	1	0.0	2	0.0
		3	15.0	3	10.0	3	4.0	2	3.0	2	5.0	3	2.0
		4	79.0	4	74.0	4	74.0	3	14.0	3	31.0	4	79.0
		5	5.0	5	15.0	5	22.0	4	63.0	4	49.0	5	19.0
								5	20.0	5	15.0		
DETROIT	100	2	2.0	2	6.0	2	5.0	1	4.0	1	7.0	2	5.0
		3	50.0	3	46.0	3	24.0	2	4.0	2	6.0	3	30.0
		4	45.0	4	43.0	4	53.0	3	28.0	3	28.0	4	61.0
		5	3.0	5	5.0	5	18.0	4	47.0	4	42.0	5	4.0
								5	17.0	5	17.0		
WASHINGTON	100	2	4.0	2	2.0	2	1.0	1	0.0	1	0.0	2	0.0
		3	22.0	3	20.0	3	17.0	2	3.0	2	3.0	3	11.0
		4	65.0	4	64.0	4	56.0	3	16.0	3	28.0	4	68.0
		5	9.0	5	14.0	5	26.0	4	61.0	4	60.0	5	21.0
								5	20.0	5	9.0		
TOTAL	300	2	2.3	2	3.0	2	2.0	1	1.3	1	2.3	2	1.7
		3	29.0	3	25.3	3	15.0	2	3.3	2	4.7	3	14.3
		4	63.0	4	60.3	4	61.0	3	19.3	3	29.0	4	69.3
		5	5.7	5	11.4	5	22.0	4	57.0	4	50.3	5	14.7
								5	19.0	5	13.7		

*CODE:
1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-9 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES FOR EACH DRIVING PHASE BY MANUFACTURER, AS-RECEIVED CONDITION

MANUFAC-TURER	# CARS	DRIVING PHASE										OVERALL DRIVEABILITY QUALITY	
		CONSTANT SPEED PHASE QUALITY		ACCELERATION FROM STOP PHASE QUALITY		RESTART PHASE QUALITY		COLD START AND IDLE PHASE QUALITY		DRIVE AWAY PHASE QUALITY			
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	2	2.9	2	2.0	2	1.0	1	0.0	1	0.0	2	0.0
		3	15.7	3	15.7	3	7.8	2	2.9	2	2.0	3	5.9
		4	73.5	4	66.6	4	66.7	3	6.9	3	15.7	4	70.6
		5	7.8	5	15.7	5	24.5	4	62.7	4	60.8	5	23.5
								5	27.5	5	21.5		
FORD	99	2	1.0	2	1.0	2	2.0	1	0.0	1	0.0	2	1.0
		3	31.3	3	33.3	3	15.2	2	0.0	2	0.0	3	16.2
		4	62.6	4	56.6	4	62.6	3	27.3	3	36.4	4	71.7
		5	5.1	5	9.1	5	20.2	4	56.6	4	54.5	5	11.1
								5	16.1	5	9.1		
CHRYSLER	99	2	3.0	2	6.0	2	3.0	1	4.0	1	7.1	2	4.0
		3	40.4	3	27.3	3	22.2	2	7.1	2	12.1	3	21.2
		4	52.5	4	57.6	4	53.6	3	24.3	3	35.4	4	65.7
		5	4.1	5	9.1	5	21.2	4	51.5	4	35.3	5	9.1
								5	13.1	5	10.1		
TOTAL	300	2	2.3	2	3.0	2	2.0	1	1.3	1	2.3	2	1.7
		3	29.0	3	25.3	3	15.0	2	3.3	2	4.7	3	14.3
		4	63.0	4	60.3	4	61.0	3	19.3	3	29.0	4	69.3
		5	5.7	5	11.3	5	22.0	4	57.0	4	50.3	5	14.7
								5	19.0	5	13.7		

*CODE:

1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-10 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES FOR EACH DRIVING PHASE BY CITY FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	DRIVING PHASE										OVERALL DRIVEABILITY QUALITY	
		CONSTANT SPEED PHASE QUALITY		ACCELERATION FROM STOP PHASE QUALITY		RESTART PHASE QUALITY		COLD START AND IDLE PHASE QUALITY		DRIVE AWAY PHASE QUALITY			
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	44	2	2.3	2	2.3	2	0.0	1	0.0	1	0.0	2	0.0
		3	15.9	3	15.9	3	4.6	2	4.5	2	2.3	3	2.3
		4	72.7	4	63.6	4	79.5	3	9.1	3	29.5	4	75.0
		5	9.1	5	18.2	5	15.9	4	68.2	4	56.8	5	22.7
								5	18.2	5	11.4		
DETROIT	49	2	2.0	2	8.2	2	8.2	1	4.1	1	10.2	2	6.1
		3	51.0	3	51.0	3	18.4	2	6.1	2	2.0	3	32.7
		4	42.9	4	36.7	4	57.1	3	22.5	3	28.6	4	57.1
		5	4.1	5	4.1	5	16.3	4	51.0	4	42.9	5	4.1
								5	16.3	5	16.3		
WASHINGTON	32	2	3.1	2	0.0	2	0.0	1	0.0	1	0.0	2	0.0
		3	18.8	3	21.9	3	15.6	2	0.0	2	0.0	3	9.4
		4	68.7	4	59.4	4	59.4	3	9.4	3	21.9	4	68.7
		5	9.4	5	18.7	5	25.0	4	65.6	4	71.9	5	21.9
								5	25.0	5	16.2		
TOTAL	125	2	2.4	2	4.0	2	3.2	1	1.6	1	4.0	2	2.4
		3	30.4	3	31.2	3	12.8	2	4.0	2	1.6	3	16.0
		4	60.0	4	52.0	4	65.8	3	14.4	3	27.2	4	66.4
		5	7.2	5	12.8	5	18.4	4	60.8	4	55.2	5	15.2
								5	19.2	5	12.0		

*CODE:
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3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-11 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES FOR EACH DRIVING PHASE BY MANUFACTURER FOR VEHICLES PASSING THE INITIAL TEST

MANUFAC-TURER	# CARS	DRIVING PHASE										OVERALL DRIVEABILITY QUALITY	
		CONSTANT SPEED PHASE QUALITY		ACCELERATION FROM STOP PHASE QUALITY		RESTART PHASE QUALITY		COLD START AND IDLE PHASE QUALITY		DRIVE AWAY PHASE QUALITY			
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	2	3.9	2	2.0	2	2.0	1	0.0	1	0.0	2	0.0
		3	15.7	3	19.6	3	7.8	2	3.9	2	2.0	3	7.8
		4	72.6	4	64.7	4	66.7	3	3.9	3	13.7	4	68.6
		5	7.8	5	13.7	5	23.5	4	64.7	4	62.7	5	23.5
								5	27.5	5	21.6		
FORD	57	2	1.7	2	1.7	2	3.5	1	0.0	1	0.0	2	1.7
		3	38.6	3	42.1	3	12.3	2	0.0	2	0.0	3	19.3
		4	54.4	4	43.9	4	66.7	3	24.6	3	35.1	4	70.2
		5	5.3	5	12.3	5	17.5	4	57.9	4	57.9	5	8.8
								5	17.5	5	7.0		
CHRYSLER	17	2	0.0	2	17.6	2	5.9	1	11.8	1	29.4	2	11.8
		3	47.1	3	29.4	3	29.4	2	17.6	2	5.9	3	29.4
		4	41.2	4	41.2	4	58.8	3	11.8	3	41.2	4	47.1
		5	11.7	5	11.8	5	5.9	4	58.8	4	23.5	5	11.7
								5	0.0	5	0.0		
TOTAL	125	2	2.4	2	4.0	2	3.2	1	1.6	1	4.0	2	2.4
		3	30.4	3	31.2	3	12.8	2	4.0	2	1.6	3	16.0
		4	60.0	4	52.0	4	65.6	3	14.4	3	27.2	4	66.4
		5	7.2	5	12.8	5	18.4	4	60.8	4	55.2	5	15.2
								5	19.2	5	12.0		

*CODE:
1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-12 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES FOR EACH DRIVING PHASE BY CITY FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	DRIVING PHASE										OVERALL DRIVEABILITY QUALITY	
		CONSTANT SPEED PHASE QUALITY		ACCELERATION FROM STOP PHASE QUALITY		RESTART PHASE QUALITY		COLD START AND IDLE PHASE QUALITY		DRIVE AWAY PHASE QUALITY			
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	56	2	0.0	2	0.0	2	0.0	1	0.0	1	0.0	2	0.0
		3	14.3	3	5.4	3	3.6	2	1.8	2	7.1	3	1.8
		4	83.9	4	82.1	4	69.6	3	17.9	3	32.1	4	82.1
		5	1.8	5	12.5	5	26.8	4	58.9	4	42.9	5	16.1
								5	21.4	5	17.9		
DETROIT	51	2	2.0	2	3.9	2	2.0	1	3.9	1	3.9	2	3.9
		3	49.0	3	41.2	3	29.4	2	2.0	2	9.8	3	27.5
		4	47.0	4	49.0	4	49.0	3	33.3	3	27.4	4	64.7
		5	2.0	5	5.9	5	19.6	4	43.1	4	41.2	5	3.9
								5	17.7	5	17.7		
WASHINGTON	68	2	4.4	2	2.9	2	1.5	1	0.0	1	0.0	2	0.0
		3	23.5	3	19.1	3	17.6	2	4.4	2	4.4	3	11.8
		4	63.3	4	66.2	4	54.4	3	19.1	3	30.9	4	67.6
		5	8.8	5	11.8	5	26.5	4	58.8	4	54.4	5	20.6
								5	17.7	5	10.3		
TOTAL	175	2	2.3	2	2.3	2	1.1	1	1.1	1	1.1	2	1.1
		3	28.0	3	21.1	3	16.6	2	2.9	2	6.9	3	13.2
		4	65.1	4	66.3	4	57.7	3	22.9	3	30.3	4	71.4
		5	4.6	5	10.3	5	24.6	4	54.3	4	46.9	5	14.3
								5	18.8	5	14.8		

*CODE:
1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-13 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES FOR EACH DRIVING PHASE BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST

MANUFAC-TURER	# CARS	DRIVING PHASE										OVERALL DRIVEABILITY QUALITY	
		CONSTANT SPEED PHASE QUALITY		ACCELERATION FROM STOP PHASE QUALITY		RESTART PHASE QUALITY		COLD START AND IDLE PHASE QUALITY		DRIVE AWAY PHASE QUALITY			
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	2	2.0	2	2.0	2	0.0	1	0.0	1	0.0	2	0.0
		3	15.7	3	11.8	3	7.8	2	2.0	2	2.0	3	3.9
		4	74.5	4	68.6	4	66.7	3	9.8	3	17.6	4	72.6
		5	7.8	5	17.6	5	25.5	4	60.8	4	58.8	5	23.5
								5	27.4	5	21.6		
FORD	42	2	0.0	2	0.0	2	0.0	1	0.0	1	0.0	2	0.0
		3	21.4	3	21.4	3	19.0	2	0.0	2	0.0	3	11.9
		4	73.8	4	73.8	4	57.2	3	30.9	3	38.1	4	73.8
		5	4.8	5	4.8	5	23.8	4	54.8	4	50.0	5	14.3
								5	14.3	5	11.9		
CHRYSLER	82	2	3.7	2	3.7	2	2.4	1	2.4	1	2.4	2	2.4
		3	39.0	3	26.8	3	20.7	2	4.9	2	13.4	3	19.5
		4	54.9	4	61.0	4	52.4	3	26.8	3	34.2	4	69.5
		5	2.4	5	8.5	5	24.4	4	50.0	4	37.8	5	8.6
								5	15.9	5	12.2		
TOTAL	175	2	2.3	2	2.3	2	1.1	1	1.1	1	1.1	2	1.1
		3	28.0	3	21.1	3	16.6	2	2.9	2	6.9	3	13.2
		4	65.1	4	66.3	4	57.7	3	22.9	3	30.3	4	71.4
		5	4.6	5	10.3	5	24.6	4	54.3	4	46.9	5	14.3
								5	18.8	5	14.8		

*CODE:

1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-14 PERCENT OF VEHICLES IN AS-RECEIVED CONDITION IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES BY CUBIC INCH DISPLACEMENT BY MANUFACTURER FOR THE CONSTANT SPEED PHASE

MANUFACTURER	CUBIC INCH DISPLACEMENT	NO. CARS	Quality FAIL	Quality POOR	Quality FAIR	Quality GOOD	Quality EXCEL
GENERAL MOTORS	LESS THAN 150	8	0	25	63	12	0
	150 TO 259	8	0	12	38	50	0
	260 TO 310	18	0	0	6	78	16
	GREATER THAN 310	68	0	0	10	83	7
FORD	LESS THAN 150	9	0	11	33	56	0
	150 TO 259	23	0	0	48	52	0
	260 TO 310	13	0	0	23	69	8
	GREATER THAN 310	54	0	0	26	67	7
CHRYSLER	LESS THAN 150	0	0	0	0	0	0
	150 TO 259	41	0	5	44	44	7
	260 TO 310	0	0	0	0	0	0
	GREATER THAN 310	58	0	2	38	58	2

***CODE:**

1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-15 PERCENT OF VEHICLES IN AS-RECEIVED CONDITION IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES BY CUBIC INCH DISPLACEMENT BY MANUFACTURER FOR THE ACCELERATION FROM STOP PHASE

MANUFACTURER	CUBIC INCH DISPLACEMENT	NO. CARS	QUALITY				
			FAIL	POOR	FAIR	GOOD	EXCEL
GENERAL MOTORS	LESS THAN 150	8	0	12	88	0	0
	150 TO 259	8	0	12	38	50	0
	260 TO 310	18	0	0	0	83	17
	GREATER THAN 310	68	0	0	9	72	19
FORD	LESS THAN 150	9	0	11	45	44	0
	150 TO 259	23	0	0	43	48	9
	260 TO 310	13	0	0	23	69	8
	GREATER THAN 310	54	0	0	30	59	11
CHRYSLER	LESS THAN 150	0	0	0	0	0	0
	150 TO 259	41	0	7	29	56	8
	260 TO 310	0	0	0	0	0	0
	GREATER THAN 310	58	0	5	26	59	10

***CODE:**
1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-16 PERCENT OF VEHICLES IN AS-RECEIVED CONDITION IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES BY CUBIC INCH DISPLACEMENT BY MANUFACTURER FOR THE RESTART PHASE

			QUALITY				
MANUFACTURER	CUBIC INCH DISPLACEMENT	NO. CARS	FAIL	POOR	FAIR	GOOD	EXCEL
GENERAL MOTORS	LESS THAN 150	8	0	0	50	50	0
	150 TO 259	8	0	0	37	63	0
	260 TO 310	18	0	0	0	61	39
	GREATER THAN 310	68	0	1	2	71	26
FORD	LESS THAN 150	9	0	11	11	45	33
	150 TO 259	23	0	0	13	74	13
	260 TO 310	13	0	0	8	46	46
	GREATER THAN 310	54	0	2	18	65	15
CHRYSLER	LESS THAN 150	0	0	0	0	0	0
	150 TO 259	41	0	5	22	51	22
	260 TO 310	0	0	0	0	0	0
	GREATER THAN 310	58	0	2	22	55	21

*CODE:
1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-17 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES BY CUBIC INCH DISPLACEMENT BY MANUFACTURER FOR THE COLD START AND IDLE PHASE

MANUFACTURER	CUBIC INCH DISPLACEMENT	NO. CARS	QUALITY				
			FAIL	POOR	FAIR	GOOD	EXCEL
GENERAL MOTORS	LESS THAN 150	8	0	12	38	50	0
	150 TO 259	8	0	12	25	63	0
	260 TO 310	18	0	6	0	50	44
	GREATER THAN 310	68	0	0	3	68	29
FORD	LESS THAN 150	9	0	0	22	56	22
	150 TO 259	23	0	0	30	52	18
	260 TO 310	13	0	0	31	38	31
	GREATER THAN 310	54	0	0	26	63	11
CHRYSLER	LESS THAN 150	0	0	0	0	0	0
	150 TO 259	41	5	10	17	51	17
	260 TO 310	0	0	0	0	0	0
	GREATER THAN 310	58	4	5	29	52	10

*CODE:
1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-18 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES BY CUBIC INCH DISPLACEMENT BY MANUFACTURER FOR THE DRIVE AWAY PHASE

			QUALITY				
MANUFACTURER	CUBIC INCH DISPLACEMENT	NO. CARS	FAIL	POOR	FAIR	GOOD	EXCEL
GENERAL MOTORS	LESS THAN 150	8	0	12	50	38	0
	150 TO 259	8	0	0	62	38	0
	260 TO 310	18	0	5	6	67	22
	GREATER THAN 310	68	0	0	9	65	26
FORD	LESS THAN 150	9	0	0	33	67	0
	150 TO 259	23	0	0	48	48	4
	260 TO 310	13	0	0	31	31	38
	GREATER THAN 310	54	0	0	33	61	6
CHRYSLER	LESS THAN 150	0	0	0	0	0	0
	150 TO 259	41	10	15	24	41	10
	260 TO 310	0	0	0	0	0	0
	GREATER THAN 310	58	5	11	43	31	10

***CODE:**

1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-19 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES BY CUBIC INCH DISPLACEMENT BY MANUFACTURER FOR OVERALL DRIVEABILITY QUALITY

			QUALITY				
MANUFACTURER	CUBIC INCH DISPLACEMENT	NO. CARS	FAIL	POOR	FAIR	GOOD	EXCEL
GENERAL MOTORS	LESS THAN 150	8	0	0	50	50	0
	150 TO 259	8	0	0	25	75	0
	260 TO 310	18	0	0	0	61	39
	GREATER THAN 310	68	0	0	0	75	25
FORD	LESS THAN 150	9	0	11	22	56	11
	150 TO 259	23	0	0	26	70	4
	260 TO 310	13	0	0	8	69	23
	GREATER THAN 310	54	0	0	13	76	11
CHRYSLER	LESS THAN 150	0	0	0	0	0	0
	150 TO 259	41	0	7	24	59	10
	260 TO 310	0	0	0	0	0	0
	GREATER THAN 310	58	0	2	19	71	8

*CODE:
1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-20 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES BY CUBIC INCH DISPLACEMENT BY MANUFACTURER FOR OVERALL DRIVEABILITY QUALITY FOR VEHICLES PASSING THE INITIAL TEST

			QUALITY				
MANUFACTURER	CUBIC INCH DISPLACEMENT	NO. CARS	FAIL	POOR	FAIR	GOOD	EXCEL
GENERAL MOTORS	LESS THAN 150	5	0	0	60	40	0
	150 TO 259	3	0	0	33	67	0
	260 TO 310	11	0	0	0	55	45
	GREATER THAN 310	32	0	0	0	78	22
FORD	LESS THAN 150	8	0	12	25	50	13
	150 TO 259	17	0	0	35	65	0
	260 TO 310	5	0	0	0	100	0
	GREATER THAN 310	27	0	0	11	74	15
CHRYSLER	LESS THAN 150	0	0	0	0	0	0
	150 TO 259	8	0	25	38	25	12
	260 TO 310	0	0	0	0	0	0
	GREATER THAN 310	9	0	0	22	67	11

*CODE:
1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-21 PERCENT OF VEHICLES IN EACH OF THE CONTRACTOR DRIVEABILITY QUALITY* CATEGORIES BY CUBIC INCH DISPLACEMENT BY MANUFACTURER FOR OVERALL DRIVEABILITY QUALITY FOR VEHICLES FAILING THE INITIAL TEST

			QUALITY				
MANUFACTURER	CUBIC INCH DISPLACEMENT	NO. CARS	FAIL	POOR	FAIR	GOOD	EXCEL
GENERAL MOTORS	LESS THAN 150	3	0	0	33	67	0
	150 TO 259	5	0	0	20	80	0
	260 TO 310	7	0	0	0	71	29
	GREATER THAN 310	36	0	0	0	72	28
FORD	LESS THAN 150	1	0	0	0	100	0
	150 TO 259	6	0	0	0	83	17
	260 TO 310	8	0	0	12	50	38
	GREATER THAN 310	27	0	0	15	78	7
CHRYSLER	LESS THAN 150	0	0	0	0	0	0
	150 TO 259	33	0	3	21	67	9
	260 TO 310	0	0	0	0	0	0
	GREATER THAN 310	49	0	2	18	72	8

***CODE:**

1 - FAIL (EXTREMELY UNRELIABLE)
2 - POOR (UNDESIRABLE ELEMENT EXISTS WHICH AFFECTS RELIABILITY)
3 - FAIR (UNDESIRABLE ELEMENT EXISTS BUT RELIABILITY IS MAINTAINED)
4 - GOOD (SLIGHT TRACE, SMALL INDICATION OF UNDESIRABLE ELEMENT THAT IS QUICKLY OVERCOME)
5 - EXCELLENT (NO TRACE OF UNDESIRABLE ELEMENTS)

TABLE VI-22 A COMPARISON OF CONTRACTOR DRIVEABILITY QUALITY BETWEEN PAIRS OF TEST SEQUENCES

NO. CARS	TEST SEQUENCES		CONSTANT SPEED PHASE		ACCELERATION FROM STOP PHASE		RESTART PHASE		COLD START AND IDLE PHASE		DRIVE AWAY PHASE		OVERALL DRIVEABILITY QUALITY	
			MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
113	COMPARING TESTS 1 & 2 FOR VEHICLES TAKING ONLY 1 & 2	BEFORE TEST 2	3.67	0.60	3.75	0.62	4.02	0.74	3.84	0.82	3.68	0.88	3.92	0.63
		AFTER TEST 2	3.67	0.59	3.75	0.66	3.88	0.61	3.77	0.84	3.60	0.83	3.93	0.61
75	COMPARING TESTS 1 & 3 FOR VEHICLES TAKING ONLY 1 & 3	BEFORE TEST 3	3.73	0.58	3.92	0.65	4.04	0.67	3.88	0.73	3.65	0.80	4.04	0.56
		AFTER TEST 3	3.65	0.64	3.83	0.74	3.93	0.70	3.77	0.85	3.55	0.81	3.89	0.56
68	COMPARING TESTS 2 & 3 FOR VEHICLES TAKING ONLY 1, 2 & 3	BEFORE TEST 3	3.60	0.60	3.70	0.65	3.82	0.64	3.72	0.79	3.53	0.78	3.93	0.63
		AFTER TEST 3	3.60	0.60	3.72	0.64	3.86	0.67	3.66	0.80	3.47	0.91	3.78	0.59
36	COMPARING TESTS 2 & 4 FOR VEHICLES TAKING ONLY 1, 2 & 4	BEFORE TEST 4	3.67	0.53	3.75	0.55	3.86	0.64	3.78	0.48	3.72	0.61	3.94	0.47
		AFTER TEST 4	3.64	0.48	3.83	0.51	3.83	0.44	3.61	0.64	3.53	0.61	3.92	0.37
72	COMPARING TESTS 3 & 4 FOR VEHICLES TAKING ONLY 1, 3 & 4	BEFORE TEST 4	3.76	0.64	3.92	0.60	3.94	0.71	3.79	0.75	3.62	0.81	3.96	0.52
		AFTER TEST 4	3.68	0.47	3.79	0.63	3.79	0.56	3.71	0.64	3.50	0.65	3.93	0.49

TABLE VI-23 A COMPARISON OF CONTRACTOR DRIVEABILITY QUALITY BETWEEN PAIRS OF TEST SEQUENCES 4-10

NO. CARS	TEST SEQUENCES		CONSTANT SPEED PHASE		ACCELERATION FROM STOP PHASE		RESTART PHASE		COLD START AND IDLE PHASE		DRIVE AWAY PHASE		OVERALL DRIVEABILITY QUALITY	
			MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
12	COMPARING TESTS 4&5 FOR VEHICLES TAKING ONLY 1, 4&5	BEFORE TEST 5	3.83	0.58	3.92	0.51	4.00	0.60	3.75	0.75	3.67	0.65	4.08	0.51
		AFTER TEST 5	3.75	0.45	4.00	0.74	4.00	0.43	4.00	0.60	3.83	0.58	4.00	0.60

TABLE VI-24 PERCENT DIFFERENCES BETWEEN BEFORE AND AFTER TEST 3 VARIABLES

OBS	CITY	MANUFACT	VEHNUM	CID	MILEAGE	DIDLCO	DRPM	DQUAL	DIQLTY	TI	TT3	DFTPHC	DFTPCO	DFTPNX	DFTPMPG
1	CHICAGO	CHRYSLER	003	225	8205	100	11.765	0.000	-33.333	T	T	35.543	50.97	-4.539	-3.081
2	CHICAGO	CHRYSLER	004	225	1685	98	21.053	0.000	-33.333	T	T	21.038	54.90	-41.291	-15.181
3	CHICAGO	CHRYSLER	005	225	1543	100	1.429	0.000	0.000	T	T	63.441	87.46	2.982	-7.046
4	CHICAGO	CHRYSLER	006	318	7857	100	2.597	0.000	0.000	T	P	48.918	62.68	0.042	0.352
5	CHICAGO	CHRYSLER	009	318	3164	98	7.500	20.000	20.000	T	P	66.408	85.62	-29.415	-8.901
6	CHICAGO	CHRYSLER	010	360	9559	45	11.111	0.000	0.000	T	T	42.497	62.42	6.437	-2.572
7	CHICAGO	CHRYSLER	011	318	4854	-9	5.556	0.000	0.000	T	P	23.761	26.73	-2.780	-4.281
8	CHICAGO	CHRYSLER	013	360	8107	98	6.250	0.000	25.000	T	P	62.604	78.26	-5.087	-0.406
9	CHICAGO	CHRYSLER	014	225	4904	100	6.250	0.000	0.000	T	P	69.659	79.57	-48.544	-8.901
10	CHICAGO	CHRYSLER	015	225	14336	77	2.817	0.000	-33.333	T	P	62.767	74.24	-18.100	-5.159
11	CHICAGO	CHRYSLER	017	225	1357	92	-7.143	0.000	0.000	T	P	39.660	33.68	62.343	5.223
12	CHICAGO	CHRYSLER	018	225	5370	100	3.846	0.000	0.000	T	T	47.837	81.74	-4.456	-3.568
13	CHICAGO	CHRYSLER	019	225	1209	95	-6.667	0.000	0.000	T	T	51.432	85.14	-17.016	-1.326
14	CHICAGO	CHRYSLER	021	318	1089	100	15.476	-25.000	-33.333	T	T	17.261	8.86	4.153	-3.438
15	CHICAGO	CHRYSLER	023	318	6426	100	0.000	0.000	0.000	T	P	55.741	82.91	-4.465	-6.645
16	CHICAGO	CHRYSLER	024	318	4823	100	6.250	20.000	25.000	T	T	32.403	81.19	66.995	-3.017
17	CHICAGO	CHRYSLER	025	360	8189	99	0.000	20.000	20.000	T	T	41.119	69.77	-8.525	-1.502
18	CHICAGO	CHRYSLER	026	318	5278	100	3.030	0.000	0.000	T	P	77.756	84.14	47.214	3.216
19	CHICAGO	CHRYSLER	027	225	9363	100	15.789	0.000	0.000	T	T	52.608	76.34	-2.479	-3.327
20	CHICAGO	CHRYSLER	028	318	8597	93	0.000	0.000	0.000	T	T	53.511	78.95	5.750	-1.128
21	CHICAGO	CHRYSLER	029	225	4922	100	0.000	25.000	25.000	T	P	59.297	77.20	-5.143	-1.700
22	CHICAGO	CHRYSLER	031	360	9400	82	-20.000	0.000	0.000	T	P	64.417	35.05	-14.537	-4.081
23	CHICAGO	FORD	038	171	1956	-1900	0.000	0.000	0.000	T	T	9.598	13.65	1.491	-3.096
24	CHICAGO	FORD	046	351	4442	96	-9.333	0.000	33.333	T	P	-2.914	72.84	-5.224	3.203
25	CHICAGO	FORD	050	351	5538	-20	13.333	0.000	0.000	T	T	7.442	35.44	11.391	-2.761
26	CHICAGO	FORD	055	400	9027	100	-13.043	0.000	25.000	T	P	21.778	75.85	-49.440	-10.414
27	CHICAGO	FORD	063	400	9191	60	21.429	0.000	33.333	T	T	-15.368	60.77	-2.899	-6.797
28	CHICAGO	FORD	065	460	4942	-25	0.000	0.000	0.000	P	P	-0.357	-111.21	31.832	2.425
29	CHICAGO	GM	067	231	5839	0	-7.692	0.000	0.000	T	T	34.650	47.90	60.929	3.435
30	CHICAGO	GM	070	350	9716	99	0.000	0.000	-25.000	T	P	75.739	79.99	36.799	4.283
31	CHICAGO	GM	074	085	3035	-19900	19.048	0.000	0.000	T	T	-52.411	-50.01	14.023	-7.117
32	CHICAGO	GM	075	400	10932	99	0.000	0.000	0.000	T	P	77.525	90.08	56.879	-3.718
33	CHICAGO	GM	080	350	8422	100	14.286	0.000	-25.000	T	P	77.341	89.17	-1.298	-6.687
34	CHICAGO	GM	087	350	12198	100	0.000	20.000	0.000	T	P	72.402	77.80	-7.181	-4.844
35	CHICAGO	GM	089	400	12201	-100	-8.333	0.000	0.000	T	T	2.430	-52.66	8.184	-3.343
36	CHICAGO	GM	090	260	3912	0	7.692	0.000	0.000	T	T	-0.959	30.29	0.391	-2.681
37	CHICAGO	GM	091	350	10990	100	-21.053	-25.000	0.000	T	P	72.439	88.40	-3.721	-1.134
38	CHICAGO	GM	092	350	4936	100	14.286	20.000	20.000	T	P	61.787	87.15	-3.760	-8.297
39	CHICAGO	GM	093	350	3106	100	-18.182	0.000	25.000	T	P	58.644	82.90	-10.925	-4.246
40	CHICAGO	GM	097	260	11471	0	0.000	0.000	0.000	T	T	20.956	12.55	-6.302	-0.840
41	CHICAGO	GM	098	350	3695	50	4.000	0.000	0.000	T	T	-4.753	4.42	-1.183	0.021
42	CHICAGO	GM	100	400	9269	99	-13.636	0.000	0.000	T	P	63.814	72.21	-2.066	-3.599
43	WASHNGTN	CHRYSLER	001	225	2007	97	15.555	0.000	-25.000	T	T	27.297	66.14	-6.526	-5.062
44	WASHNGTN	CHRYSLER	002	225	9470	96	-7.143	0.000	0.000	T	P	67.003	79.37	-25.888	-21.267
45	WASHNGTN	CHRYSLER	003	225	10603	93	10.714	0.000	0.000	T	P	39.008	65.39	-9.315	-2.714
46	WASHNGTN	CHRYSLER	004	225	11543	63	-25.000	25.000	25.000	T	T	26.203	64.70	20.977	-4.053
47	WASHNGTN	CHRYSLER	005	225	3735	94	3.434	25.000	25.000	T	T	61.427	77.81	10.369	-8.025
48	WASHNGTN	CHRYSLER	007	318	9943	17	4.255	0.000	0.000	T	T	8.059	-88.46	52.249	31.251
49	WASHNGTN	CHRYSLER	008	318	10958	50	25.000	25.000	25.000	T	P	63.812	31.40	-16.039	2.507
50	WASHNGTN	CHRYSLER	009	318	10133	57	3.537	40.000	25.000	T	T	42.345	60.44	-7.892	-4.963
51	WASHNGTN	CHRYSLER	010	360	7114	90	9.677	-25.000	-33.333	T	P	65.727	76.28	-22.362	-2.948
52	WASHNGTN	CHRYSLER	011	318	4894	90	0.000	0.000	0.000	T	T	10.183	39.84	9.803	-2.218
53	WASHNGTN	CHRYSLER	012	360	11499	90	8.974	-33.333	-50.000	T	P	76.212	86.07	-16.732	-7.475

Reproduced from best available copy.

TABLE VI- 24 PERCENT DIFFERENCES BETWEEN BEFORE AND AFTER TEST 3 VARIABLES (cont.)

OBS	CITY	MANUFACT	VEHNUM	CID	MILEAGE	DIDLCO	DRPM	DQUAL	DIGLTV	T1	TT3	DFTPHC	DFTPCO	DFTPNX	DFTPMPG
54	WASHNGTN	CHRYSLER	013	400	3152	95.385	1.403	-25.000	0.00	T	T	71.67	79.509	8.13	-1.763
55	WASHNGTN	CHRYSLER	015	225	8789	91.667	7.317	0.000	0.00	T	P	-66.18	-39.251	8.29	0.193
56	WASHNGTN	CHRYSLER	016	225	5352	97.222	21.277	20.000	0.00	T	P	77.02	87.340	-0.43	-10.463
57	WASHNGTN	CHRYSLER	017	225	12430	0.000	17.582	0.000	0.00	T	P	-11.85	14.264	57.50	-1.222
58	WASHNGTN	CHRYSLER	018	225	8707	96.512	10.714	0.000	-33.33	T	T	64.92	75.059	32.39	-16.250
59	WASHNGTN	CHRYSLER	019	225	10917	96.154	9.639	0.000	25.00	T	P	66.79	79.954	20.01	2.654
60	WASHNGTN	CHRYSLER	020	318	3742	89.236	7.317	0.000	-50.00	T	P	18.53	83.297	-57.88	-24.122
61	WASHNGTN	CHRYSLER	022	225	6819	94.444	26.471	-33.333	0.00	T	T	-18.77	66.391	16.82	-5.908
62	WASHNGTN	CHRYSLER	023	318	11039	90.385	15.730	0.000	0.00	T	T	-9.09	14.391	-20.90	6.317
63	WASHNGTN	CHRYSLER	025	360	9972	75.000	11.392	0.000	0.00	T	T	35.28	69.690	2.45	-5.393
64	WASHNGTN	CHRYSLER	026	225	8637	97.000	-5.634	0.000	0.00	T	T	59.63	75.838	16.01	-17.636
65	WASHNGTN	CHRYSLER	027	318	3341	86.354	28.571	0.000	0.00	T	T	-43.14	72.638	-8.51	-2.282
66	WASHNGTN	CHRYSLER	028	360	5875	90.000	5.405	0.000	0.00	T	P	39.88	36.252	30.81	-0.397
67	WASHNGTN	CHRYSLER	030	400	10291	58.333	10.256	0.000	25.00	T	P	83.38	90.982	10.48	2.245
68	WASHNGTN	CHRYSLER	031	360	8903	95.522	17.647	0.000	25.00	T	T	69.38	84.085	-28.46	-4.616
69	WASHNGTN	CHRYSLER	033	400	7637	45.455	16.667	0.000	-33.33	T	T	55.63	32.845	8.06	-4.440
70	WASHNGTN	FORD	040	250	13875	33.333	-60.377	20.000	60.00	T	P	46.28	2.904	-39.09	-6.410
71	WASHNGTN	FORD	041	250	13593	38.235	11.765	0.000	0.00	T	P	3.79	55.042	-2.98	-1.522
72	WASHNGTN	FORD	042	250	6434	66.667	3.226	25.000	0.00	T	P	9.76	26.995	25.83	9.962
73	WASHNGTN	FORD	045	302	12990	-33.333	-4.839	0.000	0.00	T	T	3.30	10.289	-1.99	-0.480
74	WASHNGTN	FORD	046	351	12882	-30.000	0.000	0.000	50.00	T	T	-28.49	26.696	-39.89	-10.015
75	WASHNGTN	FORD	047	351	14312	23.776	18.750	0.000	0.00	T	T	3.40	51.229	-375.01	-5.183
76	WASHNGTN	FORD	049	351	9223	75.000	2.985	20.000	25.00	T	T	12.71	67.403	-24.05	-5.372
77	WASHNGTN	FORD	050	351	13942	73.000	14.474	0.000	0.00	T	T	20.56	58.210	-31.18	-0.487
78	WASHNGTN	FORD	052	400	7774	25.000	-22.642	0.000	0.00	T	T	-12.56	-26.874	-13.76	5.382
79	WASHNGTN	FORD	057	460	5076	-50.000	7.143	0.000	0.00	T	P	-58.51	67.809	15.80	-4.214
80	WASHNGTN	FORD	058	250	3214	0.000	13.043	0.000	-33.33	P	P	1.07	4.848	3.52	-5.599
81	WASHNGTN	FORD	059	302	11509	25.000	-4.839	0.000	0.00	T	T	13.01	40.755	19.32	1.567
82	WASHNGTN	FORD	060	302	6924	33.333	20.732	20.000	25.00	T	T	9.00	31.251	14.70	-13.701
83	WASHNGTN	FORD	061	351	14000	58.000	15.335	0.000	0.00	T	T	4.23	61.965	-4.08	3.326
84	WASHNGTN	FORD	062	351	12374	45.916	-6.557	0.000	0.00	T	T	-4.97	20.692	-48.42	-0.787
85	WASHNGTN	FORD	063	351	6034	40.000	-6.557	0.000	25.00	T	T	4.12	11.831	9.31	1.818
86	WASHNGTN	FORD	064	351	5370	0.000	-2.459	0.000	-33.33	T	P	-5.15	-30.889	22.49	3.221
87	WASHNGTN	GM	067	231	10743	96.667	11.765	25.000	25.00	T	P	63.50	92.822	59.74	-7.948
88	WASHNGTN	GM	071	455	13411	0.000	-9.091	0.000	0.00	T	T	-13.11	-51.262	-10.53	5.868
89	WASHNGTN	GM	072	500	3475	25.000	0.000	0.000	20.00	T	T	-53.13	-35.539	30.09	-6.486
90	WASHNGTN	GM	080	350	5401	0.000	-9.091	-25.000	0.00	T	T	-33.19	-13.500	-11.56	4.813
91	WASHNGTN	GM	081	305	8031	-33.333	0.000	20.000	0.00	T	T	-100.24	-45.423	-0.62	3.367
92	WASHNGTN	GM	082	305	1814	40.134	6.250	20.000	0.00	T	T	81.49	92.296	-12.89	-14.486
93	WASHNGTN	GM	084	350	7421	99.697	16.667	20.000	0.00	T	P	77.32	81.068	12.63	-16.017
94	WASHNGTN	GM	086	350	14643	0.000	16.667	0.000	0.00	T	T	14.34	21.280	6.81	-6.476
95	WASHNGTN	GM	088	350	7115	0.000	-1.695	0.000	0.00	T	T	3.83	-11.255	29.43	-3.370
96	WASHNGTN	GM	089	400	10577	33.333	3.226	0.000	0.00	T	T	32.52	31.584	1.09	3.432
97	WASHNGTN	GM	091	350	3078	99.559	-19.565	0.000	25.00	T	P	72.31	85.898	-20.08	4.998
98	WASHNGTN	GM	093	350	11543	99.334	6.780	0.000	-33.33	T	P	44.17	73.013	-32.65	-10.588
99	WASHNGTN	GM	094	455	7002	98.929	15.385	0.000	0.00	T	P	45.52	78.620	-39.19	-11.617
100	WASHNGTN	GM	095	250	9644	99.236	12.000	-33.333	0.00	T	P	59.13	83.706	15.98	-5.462
101	WASHNGTN	GM	098	350	9775	33.333	20.290	20.000	0.00	T	T	36.00	30.348	9.81	-10.772
102	WASHNGTN	GM	100	400	11173	99.524	19.118	0.000	0.00	T	P	74.30	92.571	-8.07	-12.204
103	DETROIT	CHRYSLER	001	318	5823	99.130	11.765	-33.333	-33.33	T	P	21.39	55.371	6.55	-4.396
104	DETROIT	CHRYSLER	002	225	2776	93.800	36.364	0.000	0.00	T	P	60.07	81.594	28.02	-4.081
105	DETROIT	CHRYSLER	004	225	7232	70.000	23.529	0.000	-100.00	T	P	27.18	40.302	8.29	-3.237
106	DETROIT	CHRYSLER	005	225	12131	73.000	-20.000	0.000	0.00	T	P	57.75	76.596	-41.17	-6.612

TABLE VI-24 PERCENT DIFFERENCES BETWEEN BEFORE AND AFTER TEST 3 VARIABLES (cont.)

OBS	CITY	MANUFACT	VEHNUM	CID	MILEAGE	DIDLCO	DRPM	DQUAL	DIQLTY	T1	TT3	DFTPHC	DFTPCO	DFTPNX	DFTPMPG
107	DETROIT	CHRYSLER	006	318	7031	97.12	7.143	0.000	-33.33	T	T	55.7584	67.499	2.760	-8.155
108	DETROIT	CHRYSLER	007	318	11323	99.74	38.824	0.000	20.00	T	P	52.6546	89.082	64.136	-3.910
109	DETROIT	CHRYSLER	010	360	7896	99.81	1.667	-33.333	0.00	T	P	84.0767	94.659	-9.163	-3.492
110	DETROIT	CHRYSLER	011	318	9310	94.12	33.333	0.000	-33.33	T	T	41.6155	72.536	-27.036	-18.811
111	DETROIT	CHRYSLER	012	360	7090	0.00	5.405	-50.000	-100.00	T	T	37.9567	38.760	6.713	-1.560
112	DETROIT	CHRYSLER	013	360	4348	99.20	12.338	0.000	-50.00	T	P	53.2732	79.517	-61.863	-12.851
113	DETROIT	CHRYSLER	015	225	6621	-166.67	34.211	0.000	0.00	T	T	-2.5165	0.413	18.747	-5.242
114	DETROIT	CHRYSLER	019	225	9252	97.00	14.286	40.000	40.00	T	P	69.8607	90.774	1.759	-10.582
115	DETROIT	CHRYSLER	021	318	1028	78.57	23.529	0.000	-33.33	T	T	35.7912	80.046	4.599	-7.298
116	DETROIT	CHRYSLER	022	225	9237	96.57	23.529	25.000	50.00	T	T	54.8620	82.456	-5.132	-4.671
117	DETROIT	CHRYSLER	023	318	11675	96.40	13.333	0.000	0.00	T	P	61.1150	96.274	2.435	-4.843
118	DETROIT	CHRYSLER	025	360	3966	99.57	12.500	25.000	50.00	T	P	78.1401	95.026	-29.095	-36.964
119	DETROIT	CHRYSLER	026	400	6248	-33.33	7.143	0.000	0.00	T	P	35.5924	66.541	9.968	-2.134
120	DETROIT	CHRYSLER	027	225	4023	55.12	21.196	0.000	0.00	T	T	30.3327	67.588	-2.038	-6.786
121	DETROIT	CHRYSLER	028	360	6521	99.47	32.000	25.000	0.00	T	P	56.2597	84.191	29.402	-5.037
122	DETROIT	CHRYSLER	030	400	12433	98.75	27.778	0.000	33.33	T	T	23.3733	41.775	-1.620	-2.941
123	DETROIT	FORD	044	302	5289	.	9.091	25.000	40.00	T	P	-5.1411	63.407	7.156	-7.957
124	DETROIT	FORD	046	351	11613	99.63	-52.941	0.000	0.00	T	T	80.0322	93.858	-27.926	-0.953
125	DETROIT	FORD	047	351	8350	93.85	-14.286	25.000	25.00	T	T	-3.0405	55.675	-13.800	2.510
126	DETROIT	FORD	048	351	13490	66.67	-54.762	25.000	25.00	T	T	27.3901	22.802	9.019	-4.123
127	DETROIT	FORD	049	351	7834	-100.00	10.000	0.000	0.00	T	T	0.0674	68.316	-6.032	-5.249
128	DETROIT	FORD	055	400	5433	0.00	-5.000	25.000	0.00	P	P	19.3292	-20.754	9.764	-11.717
129	DETROIT	FORD	059	302	9235	50.00	-15.385	0.000	0.00	T	T	15.2489	13.297	19.532	-11.479
130	DETROIT	FORD	061	351	12910	92.85	7.143	25.000	25.00	T	T	4.8764	75.748	-39.477	-9.137
131	DETROIT	FORD	062	351	3129	50.00	3.846	-33.333	0.00	T	T	5.3120	30.901	-4.948	0.408
132	DETROIT	GM	067	231	3289	0.00	-8.696	25.000	0.00	T	P	-1.7564	9.076	8.242	-4.316
133	DETROIT	GM	076	140	6497	100.00	4.000	25.000	0.00	T	P	70.0782	68.382	-22.944	3.471
134	DETROIT	GM	077	250	13470	100.00	5.650	25.000	50.00	T	P	77.2470	93.786	-13.557	-9.785
135	DETROIT	GM	079	305	11457	100.00	-23.316	0.000	25.00	T	P	92.8901	98.166	-47.859	-19.095
136	DETROIT	GM	082	305	9698	0.00	-19.565	0.000	0.00	T	T	28.7822	38.045	5.451	-5.492
137	DETROIT	GM	084	350	14323	99.80	0.000	0.000	0.00	T	T	51.4359	64.157	7.670	-8.875
138	DETROIT	GM	085	400	11930	100.00	0.000	-25.000	0.00	T	P	78.0076	84.900	35.671	-16.225
139	DETROIT	GM	087	350	5635	100.00	9.630	20.000	0.00	T	P	69.1189	76.864	-4.826	-1.454
140	DETROIT	GM	089	400	4504	99.09	-30.000	0.000	0.00	T	P	77.2823	93.244	-8.393	-0.480
141	DETROIT	GM	096	140	12274	99.00	11.290	0.000	0.00	T	P	45.9388	65.422	6.932	-3.185
142	DETROIT	GM	098	350	6291	0.00	33.333	0.000	0.00	T	T	10.1364	10.999	5.329	-4.380
143	DETROIT	GM	099	350	10995	-100.00	14.286	0.000	0.00	T	T	38.8427	59.611	-29.209	-8.602

TABLE VI-25   MEAN PERCENT DIFFERENCES FROM TEST 1 TO TEST 3 BY MANUFACTURER

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                                    MEAN PERCENT IDLE CO  RPM EMISSION MPG FROM TESTS 1 TO 3
                                                          MANUFACT=GM

VARIABLE     N         MEAN        STANDARD        MINIMUM        MAXIMUM        STD ERROR         SUM         VARIANCE            C.V.
                                   DEVIATION         VALUE          VALUE          OF MEAN

DIDLCO      41   55.98093973    58.17313798   -100.00000000   100.00000000      9.08511780   2295.2185291   3384.1139822        103.916
DRPM        42    1.73193553    13.91708293    -30.00000000    33.33333333      2.14745252     72.7412924    193.6851972        803.557
DFTPMPG     42   -4.76502035     6.18946823    -19.09499529     5.86811353      0.95505568   -200.1308547     38.3095169       -129.894
DFTPCO      42   48.28725588    47.41259005    -52.65995011    98.16640125      7.31592147   2028.0647471   2247.9536949         98.189
DFTPHC      42   38.19718178    43.91612764   -100.24085080    92.89005089      6.77640561   1604.2816346   1928.6262672        114.972
DFTPNX      42    2.69694563    23.85924020    -47.86924369    60.92858725      3.68156069    113.2717166    569.2633431        884.676

--------------------------------------------------- MANUFACT=FORD ---------------------------------------------------------------

DIDLCO      30   37.16181008    52.99496781   -100.00000000    99.89795918      9.67551310   1114.8543025   2808.4666131        142.606
DRPM        32   -3.14614144    20.47028401    -60.37735849    21.42857143      3.61866916   -100.6765261    419.0325276       -650.647
DFTPMPG     32   -2.92595510     5.60697153    -13.70140818     9.96228896      0.99118190    -93.6305631     31.4381297       -191.629
DFTPCO      32   32.24229324    41.09413910   -111.21119628    93.85802964      7.26448611   1031.7533838   1688.7282680        127.454
DFTPHC      32    5.74724238    22.35439834    -58.51142883    80.03218784      3.95173666    183.9117560    499.7191252        388.959
DFTPNX      32  -18.09444574    70.01002677   -375.01259240    31.83237897     12.37614117   -579.0222636   4901.4038490       -386.914

------------------------------------------------- MANUFACT=CHRYSLER ------------------------------------------------------------

DIDLCO      68   82.73496437    29.13172040    -33.33333333   100.00000000      3.53274001   5625.9775770   848.65713323         35.211
DRPM        69   10.25430028    12.59133452    -25.00000000    38.82352941      1.51581855    707.5467192   158.54170490        122.791
DFTPMPG     69   -4.90036133     8.10365441    -36.96415236    31.25138257      0.97556535   -338.1249318    65.66921474       -165.369
DFTPCO      69   64.36361382    31.48332725    -88.46036961    96.27394833      3.79014721   4441.0893537   991.19989501         48.915
DFTPHC      69   43.55404355    28.78750581    -66.17577009    84.07672590      3.46560844   3005.2290048   828.72049056         66.096
DFTPNX      69    1.14817052    26.20498336    -61.86349454    66.99525664      3.15470928     79.2237657   686.70115302       2282.325

                                                        TOTAL

DIDLCO     139   65.00755690    48.27773711   -100.00000000   100.00000000      4.09486422   9036.0504086   2330.7399009         74.265
DRPM       143    4.75252787    15.96214430    -60.37735849    38.82352941      1.33482156    679.6114854    254.7900506        335.866
DFTPMPG    143   -4.41878566     7.07262588    -36.96415236    31.25138257      0.59144269   -631.8863496     50.0220369       -160.058
DFTPCO     143   52.45389849    40.72466529   -111.21119628    98.16640125      3.40556760   7500.9074846   1658.4983627         77.639
DFTPHC     143   33.52043633    35.94462198   -100.24085080    92.89005089      3.00584029   4793.4223954   1292.0158491        107.232
DFTPNX     143   -2.70298448    40.40357639   -375.01259240    66.99525664      3.37871679   -386.5267814   1632.4489851      -1494.776
```

TABLE VI-26 OVERALL DRIVEABILITY QUALITY FOR VEHICLES AT TEST 1 AND 3 BY MANUFACTURER

```
                TABLE OF MANUFACM BY  TEST 1

MANUFACM
                          QUALITY CODE*
FREQUENCY|
 PERCENT |
 ROW PCT |
 COL PCT |       2 |       3 |       4 |       5 |  TOTAL
---------+--------+--------+--------+--------+
      GM |       0 |       2 |      28 |      12 |     42
         |    0.00 |    1.40 |   19.58 |    8.39 |  29.37
         |    0.00 |    4.76 |   66.67 |   28.57 |
         |    0.00 |   10.00 |   28.57 |   52.17 |
---------+--------+--------+--------+--------+
    FORD |       0 |       5 |      22 |       5 |     32
         |    0.00 |    3.50 |   15.38 |    3.50 |  22.38
         |    0.00 |   15.63 |   68.75 |   15.63 |
         |    0.00 |   25.00 |   22.45 |   21.74 |
---------+--------+--------+--------+--------+
CHRYSLER |       2 |      13 |      48 |       6 |     69
         |    1.40 |    9.09 |   33.57 |    4.20 |  48.25
         |    2.90 |   18.84 |   69.57 |    8.70 |
         |  100.00 |   65.00 |   48.98 |   26.09 |
---------+--------+--------+--------+--------+
TOTAL            2       20       98       23      143
              1.40    13.99    68.53    16.08   100.00
```

```
                TABLE OF MANUFACM BY  TEST 3

MANUFACM      QFINAL3

FREQUENCY|                QUALITY CODE*
 PERCENT |
 ROW PCT |
 COL PCT |       2 |       3 |       4 |       5 |  TOTAL
---------+--------+--------+--------+--------+
      GM |       0 |       5 |      29 |       8 |     42
         |    0.00 |    3.50 |   20.28 |    5.59 |  29.37
         |    0.00 |   11.90 |   69.05 |   19.05 |
         |    0.00 |   14.71 |   30.53 |   61.54 |
---------+--------+--------+--------+--------+
    FORD |       0 |      10 |      20 |       2 |     32
         |    0.00 |    6.99 |   13.99 |    1.40 |  22.38
         |    0.00 |   31.25 |   62.50 |    6.25 |
         |    0.00 |   29.41 |   21.05 |   15.38 |
---------+--------+--------+--------+--------+
CHRYSLER |       1 |      19 |      46 |       3 |     69
         |    0.70 |   13.29 |   32.17 |    2.10 |  48.25
         |    1.45 |   27.54 |   66.67 |    4.35 |
         |  100.00 |   55.88 |   48.42 |   23.08 |
---------+--------+--------+--------+--------+
TOTAL            1       34       95       13      143
              0.70    23.78    66.43     9.09   100.00
```

*QUALITY CODE: 1 - FAIL   3 - FAIR   5 - EXCELLENT
2 - POOR   4 - GOOD

TABLE VI-27 IDLE QUALITY FOR VEHICLES AT TESTS 1 AND 3 BY MANUFACTURER

```
                    TABLE OF MANUFACM BY TEST 1

MANUFACM      IQLTY
                         QUALITY CODE*
FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       1|       2|       3|       4|       5|  TOTAL
---------+--------+--------+--------+--------+--------+
      GM |       0|       0|       6|      34|       2|     42
         |    0.00|    0.00|    4.20|   23.78|    1.40|  29.37
         |    0.00|    0.00|   14.29|   80.95|    4.76|
         |    0.00|    0.00|   13.04|   41.98|   22.22|
---------+--------+--------+--------+--------+--------+
    FORD |       0|       0|      15|      14|       3|     32
         |    0.00|    0.00|   10.49|    9.79|    2.10|  22.38
         |    0.00|    0.00|   46.88|   43.75|    9.38|
         |    0.00|    0.00|   32.61|   17.28|   33.33|
---------+--------+--------+--------+--------+--------+
CHRYSLER |       2|       5|      25|      33|       4|     69
         |    1.40|    3.50|   17.48|   23.08|    2.80|  48.25
         |    2.90|    7.25|   36.23|   47.83|    5.80|
         |  100.00|  100.00|   54.35|   40.74|   44.44|
---------+--------+--------+--------+--------+--------+
TOTAL            2        5       46       81        9     143
              1.40     3.50    32.17    56.64     6.29  100.00
```

```
                    TABLE OF MANUFACM BY TEST 3

MANUFACM      IQLTY3
                         QUALITY CODE*
FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       1|       2|       3|       4|       5|  TOTAL
---------+--------+--------+--------+--------+--------+
      GM |       0|       1|       9|      30|       2|     42
         |    0.00|    0.70|    6.29|   20.98|    1.40|  29.37
         |    0.00|    2.38|   21.43|   71.43|    4.76|
         |    0.00|   10.00|   16.36|   41.10|   50.00|
---------+--------+--------+--------+--------+--------+
    FORD |       0|       4|      19|       8|       1|     32
         |    0.00|    2.80|   13.29|    5.59|    0.70|  22.38
         |    0.00|   12.50|   59.38|   25.00|    3.13|
         |    0.00|   40.00|   34.55|   10.96|   25.00|
---------+--------+--------+--------+--------+--------+
CHRYSLER |       1|       5|      27|      35|       1|     69
         |    0.70|    3.50|   18.88|   24.48|    0.70|  48.25
         |    1.45|    7.25|   39.13|   50.72|    1.45|
         |  100.00|   50.00|   49.09|   47.95|   25.00|
---------+--------+--------+--------+--------+--------+
TOTAL            1       10       55       73        4     143
              0.70     6.99    38.46    51.05     2.80  100.00
```

*QUALITY CODE: 1 - FAIL 3 - FAIR 5 - EXCELLENT
2 - POOR 4 - GOOD

7.0 A COMPARISON OF CERTIFICATION AND RESTORATIVE MAINTENANCE FUEL ECONOMY

A comparison of fuel economies was conducted in Sections 4.3 and 5.1. As previously stressed, interpretation of the effects on fuel economy should only be made in light of Figures 4-16, 4-17, 4-18, and 4-19 which demonstrate the relationship between fuel economy and cubic inch displacement, and which show the population of vehicles by cubic inch displacement for each manufacturer. For instance, Table VII-1 seems to indicate slightly better fuel economy for Chrysler vehicles than for Ford or GM vehicles until examination of Figure 4-19 shows that the population of Chrysler vehicles is dominated by small displacement engines which obtain better fuel economy than large displacement engines.

The certification fuel economies presented are the fuel economies obtained after the engine has been broken in, but before substantial mileage has been accumulated. These data are 4,000 mile data. The restorative maintenance fuel economies presented in the tables are the fuel economies obtained at the point the vehicle was tested in the RM program. The mileages on the vehicles tested in the RM program range between 696 and 14,790 miles. There are 51 vehicles of the 300 vehicles tested with mileages less than 4,000 miles.

Examination of Tables VII-1 through VII-6 shows that the greatest percent difference between certification and restorative maintenance fuel economies is 8% and for the sample sizes indicated, no statistically significant differences may be noted in any of the tables. This result was obtained by testing to see if the percent differences were statistically different from zero as in Section 6.5. This is not the only test that may be applied in this instance, however. A simple sign test may be applied to determine if the number of + and - signs, when calculating the difference between certification and restorative maintenance fuel economies, are statistically equivalent. Unfortunately, the power of this test is severely reduced because the values of the certification fuel economies are values rounded to the nearest whole number. Results of the sign test indicate that the percent differences are not normally distributed about zero and that the certification fuel economies are almost always larger than the restorative maintenance fuel economies, although the magnitude of the difference is not statistically significant.

Tables VII-3 and VII-4 present the fuel economies of the 238 vehicles that passed one of the tests 1 through 4. Only the fuel economy of the vehicle in the test in which it passed the FTP standards was used in the calculation of the harmonic mean. As shown in Sections 5 and 6.4, a significant change in emissions levels due to adjustment or maladjustment of specification tolerances is not necessarily accompanied by a significant change in fuel economy.

TABLE VII-1 A COMPARISON OF CERTIFICATION AND RESTORATIVE MAINTENANCE (RM) FUEL ECONOMIES AT THE INITIAL TEST BY MANUFACTURER

MANUFACTURER	NO. CARS	DRIVING SEQUENCE	CERTIFICATION FUEL ECONOMY* Harmonic Mean	CERTIFICATION FUEL ECONOMY* S.D.	RM FUEL ECONOMY* IN THE INITIAL TEST Harmonic Mean	RM FUEL ECONOMY* IN THE INITIAL TEST S.D.	PERCENT CHANGE IN FUEL ECONOMY* FROM CERTIFICATION TO RM Mean	PERCENT CHANGE IN FUEL ECONOMY* FROM CERTIFICATION TO RM S.D.
GENERAL MOTORS	102	URBAN	14.35	2.15	13.75	2.44	3.42	6.74
		HIGHWAY	19.77	3.18	19.42	3.37	1.39	5.74
		COMPOSITE	16.37	2.49	15.83	2.75	2.75	5.47
FORD	99	URBAN	14.14	2.50	13.32	2.50	5.39	7.81
		HIGHWAY	19.53	3.44	18.77	3.44	3.52	8.12
		COMPOSITE	16.15	2.83	15.32	2.82	4.76	7.36
CHRYSLER	99	URBAN	14.53	2.90	14.05	2.60	3.11	8.69
		HIGHWAY	20.39	2.92	20.26	2.89	0.21	8.94
		COMPOSITE	16.68	2.93	16.30	2.71	2.12	7.90
TOTAL	300	URBAN	14.34	2.52	13.70	2.52	3.97	7.81
		HIGHWAY	19.89	3.21	19.46	3.32	1.70	7.80
		COMPOSITE	16.40	2.75	15.81	2.79	3.20	7.04

*Fuel economy in mi/gal

TABLE VII-2 A COMPARISON OF CERTIFICATION AND RESTORATIVE MAINTENANCE FUEL ECONOMIES AT THE INITIAL TEST BY CUBIC INCH DISPLACEMENT

CUBIC INCH DISPLACEMENT	NO. CARS	DRIVING SEQUENCE	CERTIFICATION FUEL ECONOMY*		RESTORATIVE MAINTENANCE (RM) FUEL ECONOMY* IN THE INITIAL TEST		PERCENT CHANGE IN FUEL ECONOMY* FROM CERTIFICATION TO RM	
			Harmonic Mean	S.D.	Harmonic Mean	S.D.	Mean	S.D.
LESS THAN 225	25	URBAN	20.25	2.96	19.12	2.36	5.48	8.14
		HIGHWAY	28.38	4.87	27.69	3.72	2.42	9.89
		COMPOSITE	23.25	3.59	22.22	2.75	4.44	8.31
225	41	URBAN	17.99	0.39	17.23	1.48	3.55	8.44
		HIGHWAY	23.75	1.34	23.53	1.71	0.55	7.33
		COMPOSITE	20.19	0.61	19.59	1.46	2.52	7.13
GREATER THAN 225 AND LESS THAN 300	29	URBAN	16.28	1.04	15.86	1.29	2.29	5.56
		HIGHWAY	22.01	1.98	21.30	2.26	2.94	5.21
		COMPOSITE	18.44	1.31	17.92	1.57	2.58	4.69
GREATER THAN 300 AND LESS THAN 350	56	URBAN	14.20	1.45	13.74	1.25	2.91	9.35
		HIGHWAY	19.67	1.65	19.44	1.45	0.74	10.07
		COMPOSITE	16.23	1.51	15.83	1.25	2.20	9.00
350, 360	89	URBAN	13.15	1.07	12.62	1.16	3.68	6.74
		HIGHWAY	18.64	1.24	18.23	1.67	1.77	6.96
		COMPOSITE	15.16	1.03	14.65	1.28	3.04	5.84
400	35	URBAN	12.14	1.14	11.63	0.57	4.19	7.60
		HIGHWAY	17.13	1.09	16.84	0.95	1.55	6.73
		COMPOSITE	13.97	1.06	13.51	0.59	3.28	6.46
GREATER THAN 400	25	URBAN	12.27	1.34	11.14	1.67	8.18	7.99
		HIGHWAY	16.71	1.72	15.96	2.24	3.60	7.32
		COMPOSITE	13.93	1.46	12.89	1.86	6.57	7.22

---

*Fuel economy in mi/gal

TABLE VII-3 A COMPARISON FOR CERTIFICATION AND RESTORATIVE MAINTENANCE (RM) FUEL ECONOMIES BY MANUFACTURER FOR ALL VEHICLES ON THEIR PASSING TEST SEQUENCE

MANUFACTURER	NO. CARS	DRIVING SEQUENCE	CERTIFICATION FUEL ECONOMY HARMONIC MEAN	S.D.	RM FUEL ECONOMY HARMONIC MEAN	S.D.	PERCENT CHANGE IN FUEL ECONOMY FROM CERT. TO RM MEAN	S.D.
GENERAL MOTORS	86	URBAN	14.43	2.11	14.13	2.32	1.54	6.84
		HIGHWAY	19.89	3.20	19.58	3.38	1.14	6.18
		COMPOSITE	16.46	2.47	16.15	2.66	1.49	5.39
FORD	77	URBAN	14.51	2.75	13.67	2.61	5.36	9.36
		HIGHWAY	19.89	3.81	19.09	3.80	3.63	7.50
		COMPOSITE	16.52	3.12	15.68	2.97	4.87	7.94
CHRYSLER	75	URBAN	14.44	2.95	14.42	2.57	-0.03	10.46
		HIGHWAY	20.32	3.01	20.40	2.77	-0.58	8.49
		COMPOSITE	16.60	2.99	16.61	2.65	-0.16	8.83
TOTAL	238	URBAN	14.46	2.60	14.07	2.51	2.28	9.17
		HIGHWAY	20.02	3.35	19.67	3.42	1.40	7.56
		COMPOSITE	16.52	2.84	16.13	2.79	2.06	7.70

[*] Fuel economy in mi/gal

TABLE VII-4 A COMPARISON OF CERTIFICATION AND RESTORATIVE MAINTENANCE (RM) FUEL ECONOMIES BY CUBIC INCH DISPLACEMENT FOR ALL VEHICLES ON THEIR PASSING TEST SEQUENCE

CUBIC INCH DISPLACEMENT	NO. CARS	DRIVING SEQUENCE	CERTIFICATION FUEL ECONOMY HARMONIC MEAN	S.D.	RESTORATIVE (RM) MAINTENANCE FUEL ECONOMY HARMONIC MEAN	S.D.	PERCENT CHANGE IN FUEL ECONOMY FROM CERT. TO RM MEAN	S.D.
LESS THAN 225	23	URBAN	20.20	2.76	18.50	2.50	7.48	12.58
		HIGHWAY	28.33	4.58	27.77	3.53	1.89	10.10
		COMPOSITE	23.20	3.36	21.77	2.51	5.75	11.20
225	30	URBAN	18.06	0.31	17.48	1.90	2.12	10.50
		HIGHWAY	23.90	1.38	23.53	2.21	0.97	8.64
		COMPOSITE	20.29	0.60	19.77	1.90	1.79	9.10
GREATER THAN 225 AND LESS THAN 300	26	URBAN	16.30	1.08	15.98	1.61	2.07	6.37
		HIGHWAY	22.01	2.05	21.57	2.55	2.38	5.75
		COMPOSITE	18.46	1.36	18.09	1.89	2.23	5.49
GREATER THAN 300 AND LESS THAN 350	41	URBAN	14.30	1.46	14.23	1.16	0.34	8.04
		HIGHWAY	19.86	1.60	19.61	1.34	1.07	7.39
		COMPOSITE	16.36	1.52	16.24	1.16	0.69	7.01
350, 360	66	URBAN	13.30	1.05	13.03	0.99	1.75	7.47
		HIGHWAY	18.70	1.27	18.42	1.54	1.13	7.20
		COMPOSITE	15.29	1.01	15.00	1.08	1.60	6.09
400	30	URBAN	12.10	1.21	11.88	0.93	1.54	9.34
		HIGHWAY	17.20	1.17	16.99	1.17	0.90	7.43
		COMPOSITE	13.96	1.13	13.74	0.91	1.36	8.00
GREATER THAN 400	22	URBAN	12.38	1.44	11.81	2.04	3.51	11.14
		HIGHWAY	16.76	1.86	16.25	2.39	2.46	7.14
		COMPOSITE	14.02	1.59	13.47	2.14	3.30	8.25

*Fuel economy in mi/gal

8.0 REGRESSION ANALYSIS AND CONTINGENCY TABLES

The purpose of this section is to determine the correlation between the FTP and various short tests: the Federal Short Cycle, the New York, New Jersey Short Cycle, the Two-Speed Idle Short Cycle, the Clayton Key Mode Short Cycle, and the Federal Three-Mode Short Cycle. Two statistical techniques are employed for this purpose: linear regression analysis and contingency table analysis. Regression analysis reveals and measures the functional relationships between two or more variables. Contingency tables reveal associations between classifications. The results of this investigation are contained in Appendix C, Tables C-1 through C-68.

8.1 LINEAR REGRESSION ANALYSIS

Tables C-1 through C-25 present the linear regressions of the FTP and bag emissions regressed on the short cycle tests. In this analysis, the short cycle test values represent the independent variable, x, and the FTP or bag emissions, the dependent variables, y, may be expressed by the relationship, $y = mx+b$, where m is the slope of the regression line and b is the intercept of the regression line at the origin ($x = 0$). The method of least squares is employed to provide unbiased estimates of both m and b.

Two variables are provided in Tables C-1 through C-25 to indicate how well or to what degree the FTP tests correlate with each of the short cycle tests. These variables are the standard error of estimate of the slope of the regression line and the sample correlation coefficient. The deviations of pairs of values of an independent and a dependent variable from a line of regression reflect the goodness of fit of the line with the data. If it can be assumed that the deviations or prediction errors are independent and distributed normally about the line of regression, a numeric measure of these variations, the standard error of the estimate, can be computed. For example, a positive regression slope, m, minus approximately twice the standard error of estimate of the slope, changes the sign of the regression slope, then the relationship between the independent and dependent variables is not considered significant at the 0.05 level. That is, the slope is not significantly different from zero. The sample correlation coefficients in the tables are an empirical measure of the extent to which the short test emissions and FTP emissions are related linearly. The range of this measure is from -1 to +1. A correlation coefficient of 0 is interpreted to mean that the FTP and short test emissions covary independently and are not related linearly. As the sample correlation coefficient approaches ±1, the higher the degree of correlation between the two tests. Both the standard error of estimate of the regression slope and the correlation coefficient must be examined to determine a significant interdependency. For instance, the correlation coefficient may be close to +1, but the regression slope may not be statistically significant from zero. For this case, no relationship could be determined between the tests.

Of the individual shorts tests considered, the Federal Short Cycle and the New York, New Jersey short cycle tests have the greatest correlation with the HC, CO, and NOX FTP results. The linear regressions of each mode of each of the short cycle tests are given in Tables C-1 through C-11. For the Two-Speed Idle, Clayton Key Mode and Federal Three-Mode short cycle tests, multiple linear regressions are performed on all the modes combined. These results are given in Tables C-12 through C-14. The correlation coefficients for the multiple regressed short cycle tests are high but still not as large as for the Federal Short Cycle and New York, New Jersey short cycle tests. The correlation coefficients for the multiple regressed short cycle tests are larger than the correlation coefficients for the individual modes used for the multiple regressions.

Tables C-15 through C-25 present the regressions for the same short cycle tests but present the percent reduction in FTP emissions regressed on the percent reduction in the short cycle test emissions at each test sequence. Examination of these tables shows that the correlation between the percent reduction in CO emissions for the FTP and short cycle tests is very low between tests 1 and 2 for all short cycle tests, except for the Federal Three-Mode in Drive and the Federal Three-Mode in Neutral.

The best correlation between the percent reductions in short cycle and FTP CO emissions is for the Two-Speed Idle test at 2250 RPM between tests 3 and 4. The best correlation between the percent reductions in short cycle and FTP NOX emissions is also for the Two-Speed Idle Test at 2250 RPM but between tests 2 and 3. The correlation between the percent reduction in short cycle and FTP HC emissions is generally poor for all short cycle tests for all test combinations.

8.2 CONTINGENCY TABLE ANALYSIS

A two-way classification table is employed for this analysis. The two-way table contains four elements: the number of cars that passed both the FTP and short cycle test, the number of cars that failed the FTP but passed the short cycle test, the number of cars that passed the FTP but failed the short cycle test, and the number of cars that failed the FTP and failed the short cycle test. An example of this 2 by 2 matrix is taken from part of Table C-29 and is presented below.

Failure Rate	Federal Short Cycle Test	FTP HYDROCARBONS # Cars Passing	# Cars Failing	# Cars Total
10%	# cars pass	212	58	270
	# cars fail	0	30	30
	# cars total	212	88	300
	Cut Point		2.51	

The problem that a two-way contingency table seeks to solve is whether one classification is independent of the other. For example, the above table seeks to answer the question of whether the Federal Short Cycle test is as effective in passing or failing a vehicle based upon its HC level as the Federal Test Procedure. In other words, the number of vehicles passing the FTP and failing the short cycle test, an error of commission, should approach zero, just as the number of vehicles failing the FTP but passing the short cycle test, an error of omission, should approach zero. Statistically speaking, we desire to reject the hypothesis of independence and to conclude that the FTP and short tests are interdependent.

This investigation is principally concerned with determining the errors of commission in order to assess the effectiveness of the short cycle tests in passing or failing a vehicle. In our example above, the error of commission for HC alone is zero. The commission errors were determined for each short test assuming failure rates in the range of 10-50%. The cutpoints which are associated with the failure rates were established on the test sample by a ranking procedure.[6] The short test emission results were ranked from highest to lowest and the value (or values) corresponding to the 10th through 50th percentile ranks were taken as cutpoints. This procedure is simple when the cutpoint for a single pollutant is to be determined at a given failure rate. However, to determine the cutpoints for the combination of all three emissions, HC, CO and NOX, it was necessary to normalize the short test emissions so that all emissions could be ranked without weighting the results towards a particular emission (i.e., CO emissions have magnitudes much greater than HC or NOX). Normalization of the emissions was accomplished by dividing each pollutant value by a short test value which corresponds to a standard. Short test standards were obtained by linear regressions of short tests on the FTP emissions and are presented in Tables C-26 through C-28 for HC, CO, and NOX. The predicted short test standards are the values obtained by application of the regression equations at the 1975 FTP standards.

The errors of commission and the errors of omission associated with the short cycle cutpoints are presented in Tables C-29 through C-38 for each emission separately and for the combination of all emissions for each short cycle test. The Federal Short Cycle Test has the fewest errors of commission for each emission separately. The greatest number of errors of commission for all short cycle tests occur for NOX emissions, while CO emissions produce the fewest errors of commission.

The determination of the average potential effectiveness of the short cycle tests to pass or fail a vehicle as compared to the FTP includes the assessment of emission reductions as a function of failure rate. To aid in this determination of effectiveness, Tables C-39 through C-68 are presented and give the sample mean emissions at failure rates of 10 to 50% for each short test. The means are listed for four categories of vehicles: (1) passing both the FTP and short tests, (2) passing the FTP but failing the short test, (3) failing the FTP but passing the short test, and (4) failing both the FTP and short tests. The effectiveness of the short tests at the various failure rates may be inferred from these tables by determining the emission reductions that are possible on the percentage of failed vehicles. Several assumptions can be made about the level to which failed vehicles can be reduced. For example, it can be assumed that failed vehicles will have their emissions reduced to either the FTP standard or to the short test cutpoint. Using either of these assumptions (or others) and the means given in Tables C-39 through C-68, it is possible to determine the potential emission reductions at failure rates in the range of 10 to 50% for any of the short tests.

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APPENDIX A

TABLES A-1 through A-103

TABLE A-1 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE INDUCTION SYSTEM BY CITY

CITY	# CARS	INDUCTION SUBSYSTEM													
		HEATED AIR INLET DOOR		HEATED AIR INLET DIAPHRAGM		TEMPERATURE SENSORS		DELAY VALVE (FORD)		AIR FILTER ELEMENT		HOSES, TUBES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	100	1 3 6	100.0 0.0 0.0	1 3 6	99.0 0.0 1.0	0 1 3 5 6	0.0 97.0 0.0 0.0 1.0	1 3	1.0 99.0	1	100.0	1 5	94.0 6.0	3 5	100.0 0.0
DETROIT	100	1 3 6	99.0 0.0 1.0	1 3 6	99.0 0.0 1.0	0 1 3 5 6	0.0 98.0 0.0 1.0 1.0	1 3	0.0 100.0	1	100.0	1 5	97.0 3.0	3 5	100.0 0.0
WASHINGTON	100	1 3 6	99.0 1.0 0.0	1 3 6	99.0 1.0 0.0	0 1 3 5 6	1.0 98.0 1.0 0.0 0.0	1 3	0.0 100.0	1	100.0	1 5	97.0 3.0	3 5	99.0 1.0
TOTAL	300	1 3 6	99.4 0.3 0.3	1 3 6	99.0 0.3 0.7	0 1 3 5 6	0.3 98.4 0.3 0.3 0.7	1 3	0.3 99.7	1	100.0	1 5	96.0 4.0	3 5	99.7 0.3

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-2 PERCENT OF VEHICIES WITH EACH TYPE OF PERFORMANCE* FOR THE INDUCTION SYSTEM BY MANUFACTURER

MANUFAC-TURER	# CARS	INDUCTION SUBSYSTEM													
		HEATED AIR INLET DOOR		HEATED AIR INLET DIAPHRAGM		TEMPERATURE SENSORS		DELAY VALVE (FORD)		AIR FILTER ELEMENT		HOSES, TUBES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	1	98.0	1	99.0	0	0.0	1	0.0	1	100.0	1	99.0	3	100.0
		3	1.0	3	1.0	1	99.0	3	100.0			5	1.0	5	0.0
		6	1.0	6	0.0	3	1.0								
						5	0.0								
						6	0.0								
FORD	99	1	100.0	1	98.0	0	0.0	1	1.0	1	100.0	1	94.0	3	100.0
		3	0.0	3	0.0	1	99.0	3	99.0			5	6.0	5	0.0
		6	0.0	6	2.0	3	0.0								
						5	1.0								
						6	0.0								
CHRYSLER	99	1	100.0	1	100.0			1	0.0	1	100.0	1	95.0	3	99.0
		3	0.0	3	0.0	1	97.0	3	100.0			5	5.0	5	1.0
		6	0.0	6	0.0	3	0.0								
						5	0.0								
						6	3.0								
TOTAL	300	1	99.4	1	99.0	0	0.3	1	0.3	1	100.0	1	96.0	3	99.7
		3	0.3	3	0.3	1	98.4	3	99.7			5	4.0	5	0.3
		6	0.3	6	0.7	3	0.3								
						5	0.3								
						6	0.7								

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TABLE A-3 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM

CITY	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CARBURETOR ASSEMBLY		LIMITER CAPS		IDLE MIXTURE ADJUST		IDLE SPEED		EXTERNAL IDLE ENRICH		IDLE STOP ASSEMBLY		DASHPOT AND THROTTLE		FUEL FILTER		HOSES, LINES, WIRES FOR FUEL		OTHER FUEL	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	100	1 5 6	98.0 1.0 1.0	1 5	53.0 47.0	1 4	60.0 40.0	1 4	88.0 12.0	1 3 5 6	19.0 80.0 0.0 1.0	1 3	8.0 92.0	1 3 6	1.0 99.0 0.0	1 3	99.0 1.0	1 5	99.0 1.0	3	100.0
DETROIT	100	1 5 6	100.0 0.0 0.0	1 5	67.0 37.0	1 4	63.0 37.0	1 4	65.0 35.0	1 3 5 6	17.0 83.0 0.0 0.0	1 3	0.0 100.0 0.0	1 3	99.0 0.0	1 3	99.0 0.0	1 5	99.0 1.0	3	100.0
WASHINGTON	100	1 5 6	98.0 1.0 1.0	1 5	44.0 56.0	1 4	64.0 36.0	1 4	73.0 27.0	1 3 5 6	19.0 79.0 1.0 1.0	1 3	17.0 83.0	1 3 6	0.0 99.0 1.0	1 3	100.0 0.0	1 5	100.0 0.0	3	100.0
TOTAL	300	1 5 6	98.7 0.7 0.6	1 5	54.7 45.0	1 4	62.3 37.7	1 4	75.3 24.7	1 3 5 6	18.3 80.7 0.3 0.7	1 3	12.0 88.0	1 3 6	0.3 99.4 0.3	1 3	99.7 0.3	1 5	99.3 0.7	3	100.0

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TABLE A-3 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE*
FOR THE CARBURETOR/FUEL SYSTEM BY CITY (cont.)

CITY	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CHOKE ADJUST		VACUUM DIAPHRAGM		ELECTRICAL CONTROLS		CHOKE, LINES, WIRES		EXHAUST HEAT CONTROL		ACTUATING DIAPHRAGM		COOLANT TEMPERATURE SWITCHES		CHECK VALVE		HOSES, LINES, WIRES FOR CHOKE		OTHER CHOKE	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	100	1	91.0	1	88.0	1	67.0	1	98.0	1	29.0	1	20.0	1	20.0	1	4.0	1	33.0	3	100.0
		3	0.0	3	11.0	3	32.0	3	0.0	3	71.0	3	79.0	3	79.0	3	96.0	3	66.0		
		4	9.0	6	1.0	5	0.0	5	1.0			6	1.0	6	1.0			5	1.0		
						6	1.0	6	1.0												
DETROIT	100	1	84.0	1	87.0	1	67.0	1	98.0	1	33.0	1	19.0	1	19.0	1	3.7	1	43.0	3	100.0
		3	0.0	3	9.0	3	31.0	3	0.0	3	67.0	3	81.0	3	81.0	3	97.0	3	57.0		
		4	16.0	6	4.0	5	1.0	5	2.0			6	0.0	6	0.0			5	0.0		
						6	1.0	6	0.0												
WASHINGTON	100	1	94.0	1	97.0	1	64.0	1	98.0	1	33.0	1	24.0	1	21.0	1	2.0	1	41.0	3	100.0
		3	1.0	3	2.0	3	33.0	3	1.0	3	67.0	3	76.0	3	79.0	3	98.0	3	59.0		
		4	25.0	6	1.0	5	0.0	5	1.0			6	0.0	6	0.0			5	0.0		
						6	3.0	6	0.0												
TOTAL	300	1	89.7	1	90.7	1	66.0	1	98.0	1	31.7	1	21.0	1	20.0	1	3.0	1	39.0	3	100.0
		3	0.3	3	7.3	3	32.0	3	0.3	3	68.3	3	78.7	3	79.7	3	97.0	3	60.7		
		4	10.0	6	2.0	5	0.3	5	1.3			6	0.3	6	0.3			5	0.3		
						6	1.7	6	0.3												

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TABLE A-4 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE*

FOR THE CARBURETOR/FUEL SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CARBURETOR ASSEMBLY		LIMITER CAPS		IDLE MIXTURE ADJUST		IDLE SPEED		EXTERNAL IDLE ENRICH		IDLE STOP ASSEMBLY		DASHPOT AND THROTTLE		FUEL FILTER		HOSES, LINES, WIRES FOR FUEL		OTHER FUEL	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	1 5 6	100.0 0.0 0.0	1 5	69.6 30.4	1 4	72.6 27.4	1 3 5 6	31.4 18.6	1 3 5	0.0 100.0 0.0 0.0	1 3	9.8 90.2	1 3 6	1.0 99.0 0.0	1 3	100.0 0.0	1 5	100.0 0.0	3	100.0
FORD	99	1 5 6	99.0 1.0 0.0	1 5	63.6 36.4	1 4	84.8 15.2	1 4	75.8 24.2	1 3 5 6	0.0 100.0 0.0 0.0	1 3	19.2 80.8	1 3 6	0.0 100.0 0.0	1 3	99.0 1.0	1 5	100.0 0.0	3	100.0
CHRYSLER	99	1 5 6	97.0 1.0 2.0	1 5	30.3 69.7	1 4	29.3 70.7	1 4	68.7 31.3	1 3 5 6	55.6 41.4 1.0 2.0	1 3	7.1 92.9	1 3 6	0.0 99.0 1.0	1 3	100.0 0.0	1 5	98.0 2.0	3	100.0
TOTAL	300	1 5 6	98.6 0.7 0.7	1 5	54.7 45.3	1 4	62.3 37.7	1 4	75.3 24.7	1 3 5 6	18.3 80.7 0.3 0.7	1 3	12.0 88.0	1 3 6	0.3 99.4 0.3	1 3	99.7 0.3	1 5	99.3 0.7	3	100.0

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TABLE A-4 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE*
FOR THE CARBURETOR FUEL/SYSTEM BY MANUFACTURER (cont.)

MANUFAC-TURER	# CARS			CARBURETOR/FUEL SUBSYSTEM																	
		CHOKE ADJUST		VACUUM DIAPHRAGM		ELECTRICAL CONTROLS		CHOKE, LINES, WIRES		EXHAUST HEAT CONTROL		ACTUATING DIAPHRAGM		COOLANT TEMPERATURE SWITCHES		CHECK VALVE		HOSES, LINES, WIRES FOR CHOKE		OTHER CHOKE	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	1 3 4	86.3 1.0 12.7	1 3 6	98.0 1.0 1.0	1 3 5 6	7.8 91.2 0.0 1.0	1 3 5 6	96.0 1.0 2.0 1.0	1 3	55.9 44.1	1 3 6	54.9 44.1 1.0	1 3 6	52.0 47.0 1.0	1 3	8.8 91.2	1 3 5	65.7 33.3 1.0	3	100.0
FORD	99	1 3 4	93.9 0.0 6.1	1 3 6	78.8 19.2 2.0	1 3 5 6	97.0 3.0 0.0 0.0	1 3 5 6	100.0 0.0 0.0 0.0	1 3	7.1 92.9	1 3 6	7.1 92.9 0.0	1 3 6	7.1 92.9 0.0	1 3	0.0 100.0	1 3 5	18.2 81.8 0.0	3	100.0
CHRYSLER	99	1 3 4	88.9 0.0 11.1	1 3 6	95.0 2.0 3.0	1 3 5 6	95.0 0.0 1.0 4.0	1 3 5 6	98.0 0.0 2.0 0.0	1 3	31.3 68.7	1 3 6	0.0 100.0 0.0	1 3 6	0.0 100.0 0.0	1 3	0.0 100.0	1 3 5	32.3 67.7 0.0	3	100.0
TOTAL	300	1 3 4	89.7 0.3 10.0	1 3 6	90.7 7.3 2.0	1 3 5 6	66.0 32.0 0.3 1.7	1 3 5 6	98.0 0.3 1.3 0.4	1 3	31.7 68.3	1 3 6	21.0 78.7 0.3	1 3 6	20.0 79.7 0.3	1 3	3.0 97.0	1 3 5	39.0 60.7 0.3	3	100.0

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TABLE A-5 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE IGNITION SYSTEM BY CITY

CITY	# CARS	IGNITION SUBSYSTEM															
		DISTRIBUTOR		INITIAL TIMING		SPARK PLUGS/ WIRES		VACUUM ADVANCE		SPARK DELAY DEVICES		COOLANT TEMPERATURE SWITCHES		OTHER HOSES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	100	1 6 7	99.0 1.0 0.0	1 4	88.0 12.0	1 6 8	100.0 0.0 0.0	1 3 6	96.0 2.0 2.0	1 3 5 6	23.0 76.0 0.0 1.0	1 3 6	21.0 79.0 0.0	1 5	95.0 5.0	3	100.0
DETROIT	100	1 6 7	97.0 2.0 1.0	1 4	81.0 19.0	1 6 8	100.0 0.0 0.0	1 3 6	99.0 1.0 0.0	1 3 5 6	16.0 82.0 1.0 1.0	1 3 6	21.0 78.0 1.0	1 5	98.0 2.0	3	100.0
WASHINGTON	100	1 6 7	99.0 1.0 0.0	1 4	74.0 26.0	1 6 8	95.0 3.0 2.0	1 3 6	100.0 0.0 0.0	1 3 5 6	23.0 76.0 0.0 1.0	1 3 6	29.0 71.0 0.0	1 5	97.0 3.0	3	100.0
TOTAL	300	1 6 7	98.4 1.3 0.3	1 4	81.0 19.0	1 6 8	98.3 1.0 0.7	1 3 6	98.3 1.0 0.7	1 3 5 6	20.7 78.0 0.3 1.0	1 3 6	23.7 76.0 0.3	1 5	96.7 3.3	3	100.0

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TABLE A-6 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE IGNITION SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	IGNITION SUBSYSTEM															
		DISTRIBUTOR		INITIAL TIMING		SPARK PLUGS/ WIRES		VACUUM ADVANCE		SPARK DELAY DEVICES		COOLANT TEMPERATURE SWITCHES		OTHER HOSES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	1 6 7	100.0 0.0 0.0	1 4	81.4 18.6	1 6 8	100.0 0.0 0.0	1 3 6	99.0 1.0 0.0	1 3 5 6	17.6 82.4 0.0 0.0	1 3 6	31.4 67.6 1.0	1 5	98.0 2.0	3	100.0
FORD	99	1 6 7	98.0 1.0 1.0	1 4	79.8 20.2	1 6 8	98.0 2.0 0.0	1 3 6	100.0 0.0 0.0	1 3 5 6	10.1 89.9 0.0 0.0	1 3 6	18.2 81.8 0.0	1 5	98.0 2.0	3	100.0
CHRYSLER	99	1 6 7	97.0 3.0 0.0	1 4	81.8 18.2	1 6 8	97.0 1.0 2.0	1 3 6	96.0 2.0 2.0	1 3 5 6	34.4 61.6 1.0 3.0	1 3 6	21.2 78.8 0.0	1 5	93.9 6.1	3	100.0
TOTAL	300	1 6 7	98.3 1.4 0.3	1 4	81.0 19.0	1 6 8	98.3 1.0 0.7	1 3 6	98.3 1.0 0.7	1 3 5 6	20.7 78.0 0.3 1.0	1 3 6	23.7 76.0 0.3	1 5	96.7 3.3	3	100.0

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TABLE A-7 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EGR SYSTEM BY CITY

CITY	# CARS	EGR SUBSYSTEM																	
		EGR VALVE		EGR VALVE TRANSDUCER		EGR TIME DELAY SOLENOID (CHRYSLER)		VENTURI VACUUM AMPLIFIER (CHRYSLER) (FORD)		HIGH-SPEED MODULATOR (FORD)		VACUUM RESERVOIR (FORD)		COOLANT TEMPERATURE VACUUM SWITCHES		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	100	1	92.0	1	21.0	1	9.0	1	23.0	1	0.0	1	7.0	1	71.0	1	93.0	1	0.0
		3	0.0	3	78.0	3	90.0	3	77.0	3	100.0	3	93.0	3	28.0	3	0.0	3	100.0
		5	6.0	6	1.0	6	1.0							5	0.0	5	7.0		
		6	2.0											6	1.0	6	0.0		
DETROIT	100	1	98.0	1	18.0	1	15.0	1	23.0	1	2.0	1	7.0	1	81.0	1	88.0	1	1.0
		3	2.0	3	76.0	3	85.0	3	77.0	3	98.0	3	93.0	3	19.0	3	5.0	3	99.0
		5	0.0	6	6.0	6	0.0							5	0.0	5	6.0		
		6	0.0											6	0.0	6	1.0		
WASHINGTON	100	1	98.0	1	15.0	1	14.0	1	35.0	1	0.0	1	3.0	1	80.0	1	91.0	1	0.0
		3	0.0	3	78.0	3	85.0	3	76.0	3	100.0	3	97.0	3	19.0	3	2.0	3	100.0
		5	1.0	6	7.0	6	1.0							5	1.0	5	7.0		
		6	1.0											6	0.0	6	0.0		
TOTAL	300	1	96.0	1	18.0	1	12.6	1	27.0	1	0.7	1	5.7	1	77.3	1	90.7	1	0.3
		3	0.7	3	77.3	3	86.7	3	73.0	3	99.3	3	94.3	3	22.0	3	2.3	3	99.7
		5	2.3	6	4.7	6	0.7							5	0.3	5	6.7		
		6	1.0											6	0.3	6	0.3		

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TABLE A-8 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EGR SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	EGR SUBSYSTEM																	
		EGR VALVE		EGR VALVE TRANSDUCER		EGR TIME DELAY SOLENOID (CHRYSLER)		VENTURI VACUUM AMPLIFIER (CHRYSLER) (FORD)		HIGH-SPEED MODULATOR (FORD)		VACUUM RESERVOIR (FORD)		COOLANT TEMPERATURE VACUUM SWITCHES		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	1	100.0	1	5.9	1	0.0	1	0.0	1	0.0	1	0.0	1	78.4	1	91.2	1	0.0
		3	0.0	3	92.2	3	100.0	3	100.0	3	100.0	3	100.0	3	20.6	3	2.0	3	100.0
		5	0.0	6	1.9	6	0.0							5	0.0	5	6.9		
		6	0.0											6	1.0	6	0.0		
FORD	99	1	99.0	1	48.5	1	0.0	1	5.0	1	2.0	1	17.2	1	56.6	1	91.9	1	1.0
		3	0.0	3	39.4	3	100.0	3	95.0	3	98.0	3	82.8	3	43.4	3	3.0	3	99.0
		5	0.0	6	12.1	6	0.0							5	0.0	5	4.1		
		6	1.0											6	0.0	6	1.0		
CHRYSLER	99	1	88.9	1	0.0	1	38.4	1	76.8	1	0.0	1	0.0	1	97.0	1	88.9	1	0.0
		3	2.0	3	100.0	3	59.6	3	23.2	3	100.0	3	100.0	3	2.0	3	2.0	3	100.0
		5	7.1	6	0.0	6	2.0							5	1.0	5	9.1		
		6	2.0											6	0.0	6	0.0		
TOTAL	300	1	96.0	1	18.0	1	12.6	1	27.0	1	0.7	1	5.7	1	77.4	1	90.7	1	0.3
		3	0.7	3	77.3	3	86.7	3	73.0	3	99.3	3	94.3	3	22.0	3	2.3	3	99.7
		5	2.3	6	4.7	6	0.7							5	0.3	5	6.7		
		6	1.0											6	0.3	6	0.3		

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED	6 - DEFECTIVE
1 - NO MALPERFORMANCE	7 - INADEQUATE OR IMPROPER MAINTENANCE
2 - NOT USED IN THIS PROGRAM	8 - IMPROPER PART – MISBUILD
3 - NOT APPLICABLE	9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT
4 - MALADJUSTED	
5 - DISABLED	

TABLE A-9 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE AIR PUMP SYSTEM BY CITY

CITY	# CARS	AIR PUMP SUBSYSTEM																	
		AIR PUMP		BYPASS VALVE, PUMP VALVE		CHECK VALVE		ELECTRIC PVS		SOLENOID VACUUM VALVE		FLOOR PAN SWITCH (FORD)		VACUUM DIFF. CONTROL		DRIVE BELT ATTACHING HOWE		HOSES, LINES, WIRES		OTHER AIR PUMP	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	100	1 3	34.0 66.0	1 3	34.0 66.0	1 3	34.0 66.0	1 3	1.0 99.0	1 3	2.0 98.0	1 3	0.0 100.0	1 3	5.0 95.0	1 3	34.0 66.0	1 3 5	35.0 65.0 0.0	3	100.0
DETROIT	100	1 3	34.0 66.0	1 3	34.0 66.0	1 3	34.0 66.0	1 3	3.0 97.0	1 3	3.0 97.0	1 3	2.0 98.0	1 3	30.0 70.0	1 3	34.0 66.0	1 3 5	32.0 66.0 2.0	3	100.0
WASHINGTON	100	1 3	35.0 65.0	1 3	35.0 65.0	1 3	35.0 65.0	1 3	3.0 97.0	1 3	6.0 94.0	1 3	1.0 99.0	1 3	4.0 96.0	1 3	35.0 65.0	1 3 5	35.0 65.0 0.0	3	100.0
TOTAL	300	1 3	34.3 65.7	1 3	34.3 65.7	1 3	34.3 65.7	1 3	2.3 97.7	1 3	3.7 96.3	1 3	1.0 99.0	1 3	13.0 87.0	1 3	34.3 65.7	1 3 5	34.0 65.3 0.7	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-10 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE AIR PUMP SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	AIR PUMP SUBSYSTEM																			
		AIR PUMP		BYPASS VALVE, PUMP VALVE		CHECK VALVE		ELECTRIC PVS		SOLENOID VACUUM VALVE		FLOOR PAN SWITCH (FORD)		VACUUM DIFF. CONTROL		DRIVE BELT ATTACHING HOWE		HOSES, LINES, WIRES		OTHER AIR PUMP	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	1 3	1.0 99.0	1 3	1.0 99.0	1 3	1.0 99.0	1 3	1.0 99.0	1 3	1.0 99.0	1 3	0.0 100.0	1 3	1.0 99.0	1 3	1.0 99.0	1 3 5	2.0 98.0 0.0	3	100.0
FORD	99	1 3	100.0 0.0	1 3	100.0 0.0	1 3	100.0 0.0	1 3	6.1 93.9	1 3	10.1 89.9	1 3	3.0 97.0	1 3	38.4 61.6	1 3	100.0 0.0	1 3 5	98.0 0.0 2.0	3	100.0
CHRYSLER	99	1 3	3.0 97.0	1 3	3.0 97.0	1 3	3.0 97.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	3.0 97.0	1 3 5	3.0 97.0 0.0	3	100.0
TOTAL	300	1 3	34.3 65.7	1 3	34.3 65.7	1 3	34.3 65.7	1 3	2.3 97.7	1 3	3.7 96.3	1 3	1.0 99.0	1 3	13.0 87.0	1 3	34.3 65.7	1 3 5	34.0 65.3 0.7	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-11 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE PCV SYSTEM BY CITY

CITY	# CARS	PCV SUBSYSTEM							
		PCV VALVE		FILTERS		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	100	1 3	99.0 1.0	1 3	99.0 1.0	1 3 5	98.0 1.0 1.0	3	100.0
DETROIT	100	1 3	100.0 0.0	1 3	100.0 0.0	1 3 5	99.0 0.0 1.0	3	100.0
WASHINGTON	100	1 3	100.0 0.0	1 3	100.0 0.0	1 3 5	100.0 0.0 0.0	3	100.0
TOTAL	300	1 3	99.7 0.3	1 3	99.7 0.3	1 3 5	99.0 0.3 0.7	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-12 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE PCV SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	PCV SUBSYSTEM							
		PCV VALVE		FILTERS		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	1	99.0	1	99.0	1	99.0	3	100.0
		3	1.0	3	1.0	3	1.0		
						5	0.0		
FORD	99	1	100.0	1	100.0	1	99.0	3	100.0
		3	0.0	3	0.0	3	0.0		
						5	1.0		
CHRYSLER	99	1	100.0	1	100.0	1	99.0	3	100.0
		3	0.0	3	0.0	3	0.0		
						5	1.0		
TOTAL	300	1	99.7	1	99.7	1	99.0	3	100.0
		3	0.3	3	0.3	3	0.3		
						5	0.7		

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-13 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EXHAUST SYSTEM BY CITY

CITY	# CARS	EXHAUST SUBSYSTEM					
		EXHAUST MANIFOLD, MUFFLER		CATALYST		OTHER	
		CODE	%	CODE	%	CODE	%
CHICAGO	100	1	100.0	1 3	99.0 1.0	3	100.0
DETROIT	100	1	100.0	1 3	98.0 2.0	3	100.0
WASHINGTON	100	1	100.0	1 3	97.0 3.0	3	100.0
TOTAL	300	1	100.0	1 3	98.0 2.0	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-14 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EXHAUST SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	EXHAUST SUBSYSTEM					
		EXHAUST MANIFOLD, MUFFLER		CATALYST		OTHER	
		CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	1	100.0	1 3	100.0 0.0	3	100.0
FORD	99	1	100.0	1 3	98.0 2.0	3	100.0
CHRYSLER	99	1	100.0	1 3	96.0 4.0	3	100.0
TOTAL	300	1	100.0	1 3	98.0 2.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-15 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EVAPORATION SYSTEM BY CITY

CITY	# CARS	EVAPORATION SUBSYSTEM							
		EVAPORATION CANISTER		CANISTER FILTER		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	100	1	100.0	1 6	99.0 1.0	1 5 6	99.0 1.0 0.0	3	100.0
DETROIT	100	1	100.0	1 6	100.0 0.0	1 5 6	98.0 1.0 1.0	3	100.0
WASHINGTON	100	1	100.0	1 6	100.0 0.0	1 5 6	100.0 0.0 0.0	3	100.0
TOTAL	300	1	100.0	1 6	99.7 0.3	1 5 6	99.0 0.7 0.3	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-16 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EVAPORATION SYSTEM BY MANUFACTURER

MANUFAC-TURER	# CARS	EVAPORATION SUBSYSTEM							
		EVAPORATION CANISTER		CANISTER FILTER		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	1	100.0	1 6	100.0 0.0	1 5 6	99.0 0.0 1.0	3	100.0
FORD	99	1	100.0	1 6	100.0 0.0	1 5 6	99.0 1.0 0.0	3	100.0
CHRYSLER	99	1	100.0	1 6	99.0 1.0	1 5 6	99.0 1.0 0.0	3	100.0
TOTAL	300	1	100.0	1 6	99.7 0.3	1 5 6	99.0 0.7 0.3	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-17 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE ENGINE ASSEMBLY SYSTEM BY CITY

CITY	# CARS	ENGINE ASSEMBLY SUBSYSTEM															
		ENGINE ASSEMBLY		ENGINE OIL & FILTER		COOLING SYSTEM		MECHANICAL VALVE ADJUST		CARBURETOR & INTAKE BOLTS		BELT TENSIONS		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	100	1	100.0	1 7	100.0 0.0	1 6	100.0 0.0	1 3	19.0 81.0	1	100.0	1	100.0	1	100.0	3	100.0
DETROIT	100	1	100.0	1 7	98.0 2.0	1 6	99.0 1.0	1 3	18.0 82.0	1	100.0	1	100.0	1	100.0	3	100.0
WASHINGTON	100	1	100.0	1 7	100.0 0.0	1 6	100.0 0.0	1 3	19.0 81.0	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	300	1	100.0	1 7	99.3 0.7	1 6	99.7 0.3	1 3	18.7 81.3	1	100.0	1	100.0	1	100.0	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-18 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE ENGINE ASSEMBLY SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	ENGINE ASSEMBLY SUBSYSTEM															
		ENGINE ASSEMBLY		ENGINE OIL & FILTER		COOLING SYSTEM		MECHANICAL VALVE ADJUST		CARBURETOR & INTAKE BOLTS		BELT TENSIONS		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	102	1	100.0	1 7	100.0 0.0	1 6	100.0 0.0	1 3	5.9 94.1	1	100.0	1	100.0	1	100.0	3	100.0
FORD	99	1	100.0	1 7	98.0 2.0	1 6	100.0 0.0	1 3	11.1 88.9	1	100.0	1	100.0	1	100.0	3	100.0
CHRYSLER	99	1	100.0	1 7	100.0 0.0	1 6	99.0 1.0	1 3	39.4 60.6	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	300	1	100.0	1 7	99.3 0.7	1 6	99.7 0.3	1 3	18.7 81.3	1	100.0	1	100.0	1	100.0	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-19 FREQUENCY OF MALPERFORMANCE FOR ALL COMBINATIONS OF EMISSIONS SYSTEMS TWO AT A TIME BY CITY

CITY	# CARS	SYSTEM CODE*								
		1&2	1&3	1&4	1&5	1&6	1&7	1&8	1&9	—
CHICAGO	100	7	2	0	0	0	0	2	0	
DETROIT	100	5	0	1	0	0	0	0	0	
WASHINGTON	100	3	3	2	0	0	0	0	0	
TOTAL	300	15	5	3	0	0	0	2	0	
			2&3	2&4	2&5	2&6	2&7	2&8	2&9	
CHICAGO	100		14	12	0	1	0	1	0	
DETROIT	100		22	7	2	1	0	2	3	
WASHINGTON	100		29	16	0	0	0	0	0	
TOTAL	300		65	35	2	2	0	3	3	
				3&4	3&5	3&6	3&7	3&8	3&9	
CHICAGO	100			5	0	0	0	2	0	
DETROIT	100			3	0	0	0	1	1	
WASHINGTON	100			8	0	0	0	0	0	
TOTAL	300			16	0	0	0	3	1	
					4&5	4&6	4&7	4&8	4&9	
CHICAGO	100				0	0	0	0	0	
DETROIT	100				2	0	0	0	1	
WASHINGTON	100				0	0	0	0	0	
TOTAL	300				2	0	0	0	1	
						5&6	5&7	5&8	5&9	
CHICAGO	100					0	0	0	0	
DETROIT	100					0	0	0	1	
WASHINGTON	100					0	0	0	0	
TOTAL	300					0	0	0	1	
							6&7	6&8	6&9	
CHICAGO	100						0	0	0	
DETROIT	100						0	0	0	
WASHINGTON	100						0	0	0	
TOTAL	300						0	0	0	
								7&8	7&9	
CHICAGO	100							0	0	
DETROIT	100							0	0	
WASHINGTON	100							0	0	
TOTAL	300							0	0	
									8&9	
CHICAGO	100								0	
DETROIT	100								1	
WASHINGTON	100								0	
TOTAL	300								1	

*SYSTEM CODE:
1 - INDUCTION SYSTEM
2 - CARBURETOR/FUEL
3 - IGNITION
4 - EXHAUST GAS RECIRCULATION
5 - AIR PUMP
6 - PCV
7 - EXHAUST
8 - EVAPORATION
9 - ENGINE ASSEMBLY

TABLE A-20 FREQUENCY OF MALPERFORMANCE FOR ALL COMBINATIONS OF EMISSIONS SYSTEMS TWO AT A TIME

MANUFAC-TURER	# CARS	SYSTEM CODE*								
		1&2	1&3	1&4	1&5	1&6	1&7	1&8	1&9	—
GM	102	1	0	0	0	0	0	0	0	
FORD	99	7	2	2	0	0	0	1	0	
CHRYSLER	99	7	3	1	0	0	0	1	0	
TOTAL	300	15	5	3	0	0	0	2	0	
			2&3	2&4	2&5	2&6	2&7	2&8	2&9	
GM	102		16	5	0	0	0	1	0	
FORD	99		19	11	2	1	0	1	2	
CHRYSLER	99		30	19	0	1	0	1	1	
TOTAL	300		65	35	2	2	0	3	3	
				3&4	3&5	3&6	3&7	3&8	3&9	
GM	102			2	0	0	0	1	0	
FORD	99			5	0	0	0	1	1	
CHRYSLER	99			9	0	0	0	1	0	
TOTAL	300			16	0	0	0	3	1	
					4&5	4&6	4&7	4&8	4&9	
GM	102				0	0	0	0	0	
FORD	99				2	0	0	0	1	
CHRYSLER	99				0	0	0	0	0	
TOTAL	300				2	0	0	0	1	
						5&6	5&7	5&8	5&9	
GM	102					0	0	0	0	
FORD	99					0	0	0	1	
CHRYSLER	99					0	0	0	0	
TOTAL	300					0	0	0	1	
							6&7	6&8	6&9	
GM	102						0	0	0	
FORD	99						0	0	0	
CHRYSLER	99						0	0	0	
TOTAL	300						0	0	0	
								7&8	7&9	
GM	102							0	0	
FORD	99							0	0	
CHRYSLER	99							0	0	
TOTAL	300							0	0	
									8&9	
GM	102								0	
FORD	99								0	
CHRYSLER	99								1	
TOTAL	300								1	

*SYSTEM CODE:
1 - INDUCTION SYSTEM
2 - CARBURETOR/FUEL
3 - IGNITION
4 - EXHAUST GAS RECIRCULATION
5 - AIR PUMP
6 - PCV
7 - EXHAUST
8 - EVAPORATION
9 - ENGINE ASSEMBLY

TABLE A-21 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE INDUCTION SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	INDUCTION SUBSYSTEM													
		HEATED AIR INLET DOOR		HEATED AIR INLET DIAPHRAGM		TEMPERATURE SENSORS		DELAY VALVE (FORD)		AIR FILTER ELEMENT		HOSES, TUBES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	44	1	100.0	1	100.0	1	100.0	1	2.3	1	100.0	1	93.2	3	100.0
		3	0.0	3	0.0	3	0.0	3	97.7			5	6.8		
				6	0.0	5	0.0								
						6	0.0								
DETROIT	49	1	100.0	1	98.0	1	95.9	1	0.0	1	100.0	1	95.9	3	100.0
		3	0.0	3	0.0	3	0.0	3	100.0			5	4.1		
				6	2.0	5	2.1								
						6	2.0								
WASHINGTON	32	1	96.9	1	96.9	1	96.9	1	0.0	1	100.0	1	100.0	3	100.0
		3	3.1	3	3.1	3	3.1	3	100.0			5	0.0		
				6	0.0	5	0.0								
						6	0.0								
TOTAL	125	1	99.2	1	98.4	1	97.6	1	0.8	1	100.0	1	96.0	3	100.0
		3	0.8	3	0.8	3	0.8	3	99.2			5	4.0		
				6	0.8	5	0.8								
						6	0.8								

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-22 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE INDUCTION SYSTEM BY MANUFACTURER FOR VEHICLES PASSING THE INITIAL TEST

MANUFAC-TURER	# CARS	INDUCTION SUBSYSTEM													
		HEATED AIR INLET DOOR		HEATED AIR INLET DIAPHRAGM		TEMPERATURE SENSORS		DELAY VALVE (FORD)		AIR FILTER ELEMENT		HOSES, TUBES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1 3	98.0 2.0	1 3 6	98.0 2.0 0.0	1 3 5 6	98.0 2.0 0.0 0.0	1 3	0.0 100.0	1	100.0	1 5	100.0 0.0	3	100.0
FORD	57	1 3	100.0 0.0	1 3 6	98.2 0.0 1.8	1 3 5 6	98.2 0.0 1.8 0.0	1 3	1.8 98.2	1	100.0	1 5	93.0 7.0	3	100.0
CHRYSLER	17	1 3	100.0 0.0	1 3 6	100.0 0.0 0.0	1 3 5 6	94.1 0.0 0.0 5.9	1 3	0.0 100.0	1	100.0	1 5	94.1 5.9	3	100.0
TOTAL	125	1 3	99.2 0.8	1 3 6	98.4 0.8 0.8	1 3 5 6	97.6 0.8 0.8 0.8	1 3	0.8 99.2	1	100.0	1 5	96.0 4.0	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-23 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CARBURETOR ASSEMBLY		LIMITER CAPS		IDLE MIXTURE ADJUST		IDLE SPEED		EXTERNAL IDLE ENRICH		IDLE STOP ASSEMBLY		DASHPOT AND THROTTLE		FUEL FILTER		HOSES, LINES, WIRES FOR FUEL		OTHER FUEL	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	44	1	100.0	1 5	77.3 22.7	1 4	90.9 9.1	1 4	88.6 11.4	1 3	9.1 90.9	1 3	6.8 93.2	3	100.0	1	100.0	1	100.0	3	100.0
DETROIT	49	1	100.0	1 5	91.8 8.2	1 4	87.8 12.2	1 4	75.5 24.5	1 3	4.1 95.9	1 3	8.2 91.8	3	100.0	1	100.0	1	100.0	3	100.0
WASHINGTON	32	1	100.0	1 5	68.7 31.3	1 4	96.9 3.1	1 4	84.4 15.6	1 3	9.4 90.6	1 3	25.0 75.0	3	100.0	1	100.0	1	100.0	3	100.0
TOTAL	125	1	100.0	1 5	80.8 19.2	1 4	91.2 8.8	1 4	82.4 17.6	1 3	7.2 92.8	1 3	12.0 88.0	3	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-23 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST (cont.)

CITY	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CHOKE ADJUST		VACUUM DIAPHRAGM		ELECTRICAL CONTROLS		CHOKE, LINES, WIRES		EXHAUST HEAT CONTROL		ACTUATING DIAPHRAGM		COOLANT TEMPERATURE SWITCHES		CHECK VALVE		HOSES, LINES, WIRES FOR CHOKE		OTHER CHOKE	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	44	1	88.6	1	81.8	1	63.6	1	100.0	1	31.8	1	25.0	1	25.0	1	6.8	1	36.4	3	100.0
		3	0.0	3	18.2	3	36.4	3	0.0	3	68.2	3	72.7	3	72.7	3	93.2	3	63.6		
		4	11.4	6	0.0							6	2.3	6	2.3						
DETROIT	49	1	93.9	1	77.6	1	71.4	1	100.0	1	30.6	1	18.4	1	18.4	1	0.0	1	44.9	3	100.0
		3	0.0	3	18.4	3	28.6	3	0.0	3	69.4	3	81.6	3	81.6	3	100.0	3	55.1		
		4	6.1	6	4.1							6	0.0	6	0.0						
WASHINGTON	32	1	93.8	1	96.9	1	50.0	1	96.9	1	34.4	1	31.2	1	25.0	1	3.1	1	46.9	3	100.0
		3	3.1	3	3.1	3	50.0	3	3.1	3	65.6	3	68.8	3	75.0	3	96.9	3	53.1		
		4	3.1	6	0.0							6	0.0	6	0.0						
TOTAL	125	1	92.0	1	84.0	1	63.2	1	99.2	1	32.0	1	24.0	1	22.4	1	3.2	1	42.4	3	100.0
		3	0.8	3	14.4	3	36.8	3	0.8	3	68.0	3	75.2	3	76.8	3	96.8	3	57.6		
		4	7.2	6	1.6							6	0.8	6	0.8						

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-24 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE CARBURETOR SYSTEM BY MANUFACTURER FOR VEHICLES PASSING THE INITIAL TEST

MANUFACTURER	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CARBURETOR ASSEMBLY		LIMITER CAPS		IDLE MIXTURE ADJUST		IDLE SPEED		EXTERNAL IDLE ENRICH		IDLE STOP ASSEMBLY		DASHPOT AND THROTTLE		FUEL FILTER		HOSES, LINES, WIRES FOR FUEL		OTHER FUEL	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	100.0	1 5	96.1 3.9	1 4	98.0 2.0	1 4	88.2 11.8	1 3	0.0 100.0	1 3	9.8 90.2	3	100.0	1	100.0	1	100.0	3	100.0
FORD	57	1	100.0	1 5	75.4 24.6	1 4	89.5 10.5	1 4	80.7 19.3	1 3	0.0 100.0	1 3	15.8 84.2	3	100.0	1	100.0	1	100.0	3	100.0
CHRYSLER	17	1	100.0	1 5	52.9 47.1	1 4	76.5 23.5	1 4	70.6 29.4	1 3	52.9 47.1	1 3	5.9 94.1	3	100.0	1	100.0	1	100.0	3	100.0
TOTAL	125	1	100.0	1 5	80.8 19.2	1 4	91.2 8.8	1 4	82.4 17.6	1 3	7.2 92.8	1 3	12.0 88.0	3	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-24 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE CARBURETOR SYSTEM BY MANUFACTURER FOR VEHICLES PASSING THE INITIAL TEST (cont.)

MANUFAC-TURER	# CARS			CARBURETOR/FUEL SUBSYSTEM																	
		CHOKE ADJUST		VACUUM DIAPHRAGM		ELECTRICAL CONTROLS		CHOKE, LINES, WIRES		EXHAUST HEAT CONTROL		ACTUATING DIAPHRAGM		COOLANT TEMPERATURE SWITCHES		CHECK VALVE		HOSES, LINES, WIRES FOR CHOKE		OTHER CHOKE	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	94.1	1	98.0	1	11.8	1	98.0	1	58.8	1	56.9	1	52.9	1	7.8	1	72.6	3	100.0
		3	2.0	3	2.0	3	88.2	3	2.0	3	41.2	3	41.2	3	45.1	3	92.2	3	27.4		
		4	3.9	6	0.0							6	1.9	6	2.0						
FORD	57	1	91.2	1	70.2	1	98.2	1	100.0	1	1.7	1	1.7	1	1.7	1	0.0	1	12.3	3	100.0
		3	0.0	3	28.1	3	1.8	3	0.0	3	98.3	3	98.3	3	98.3	3	100.0	3	87.7		
		4	8.8	6	1.7							6	0.0	6	0.0						
CHRYSLER	17	1	88.2	1	88.2	1	100.0	1	100.0	1	52.9	1	0.0	1	0.0	1	0.0	1	52.9	3	100.0
		3	0.0	3	5.9	3	0.0	3	0.0	3	47.1	3	100.0	3	100.0	3	100.0	3	47.1		
		4	11.8	6	5.9							6	0.0	6	0.0						
TOTAL	125	1	92.0	1	84.0	1	63.2	1	99.2	1	32.0	1	24.0	1	22.4	1	3.2	1	42.4	3	100.0
		3	0.8	3	14.4	3	36.8	3	0.8	3	68.0	3	75.2	3	76.8	3	96.8	3	57.6		
		4	7.2	6	1.6							6	0.8	6	0.8						

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED	6 - DEFECTIVE
1 - NO MALPERFORMANCE	7 - INADEQUATE OR IMPROPER MAINTENANCE
2 - NOT USED IN THIS PROGRAM	8 - IMPROPER PART – MISBUILD
3 - NOT APPLICABLE	9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT
4 - MALADJUSTED	
5 - DISABLED	

TABLE A-25 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE IGNITION SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	IGNITION SUBSYSTEM															
		DISTRIBUTOR		INITIAL TIMING		SPARK PLUGS/ WIRES		VACUUM ADVANCE		SPARK DELAY DEVICES		COOLANT TEMPERATURE SWITCHES		OTHER HOSES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	44	1	100.0	1 4	93.2 6.8	1	100.0	1 3	97.7 2.3	1 3 6	9.1 88.6 2.3	1 3 6	9.1 90.9 0.0	1 5	97.7 2.3	3	100.0
DETROIT	49	1	100.0	1 4	87.8 12.2	1	100.0	1 3	98.0 2.0	1 3 6	10.2 89.8 0.0	1 3 6	16.3 81.6 2.1	1 5	98.0 2.0	3	100.0
WASHINGTON	32	1	100.0	1 4	90.6 9.4	1	100.0	1 3	100.0 0.0	1 3 6	15.6 84.4 0.0	1 3 6	28.1 71.9 0.0	1 5	100.0 0.0	3	100.0
TOTAL	125	1	100.0	1 4	90.4 9.6	1	100.0	1 3	98.4 1.6	1 3 6	11.2 88.0 0.8	1 3 6	16.8 82.4 0.8	1 5	98.4 1.6	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-26 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE IGNITION SYSTEM BY MANUFACTURER FOR VEHICLES PASSING THE INITIAL TEST

MANUFAC-TURER	# CARS	IGNITION SUBSYSTEM															
		DISTRIBUTOR		INITIAL TIMING		SPARK PLUGS/ WIRES		VACUUM ADVANCE		SPARK DELAY DEVICES		COOLANT TEMPERATURE SWITCHES		OTHER HOSES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	100.0	1 4	92.2 7.8	1	100.0	1 3	98.0 2.0	1 3 6	13.7 86.3 0.0	1 3 6	27.4 70.6 2.0	1 5	98.0 2.0	3	100.0
FORD	57	1	100.0	1 4	86.0 14.0	1	100.0	1 3	100.0 0.0	1 3 6	3.5 96.5 0.0	1 3 6	10.5 89.5 0.0	1 5	98.2 1.8	3	100.0
CHRYSLER	17	1	100.0	1 4	100.0 0.0	1	100.0	1 3	94.1 5.9	1 3 6	29.4 64.7 5.9	1 3 6	5.9 94.1 0.0	1 5	100.0 0.0	3	100.0
TOTAL	125	1	100.0	1 4	90.4 9.6	1	100.0	1 3	98.4 1.6	1 3 6	11.2 88.0 0.8	1 3 6	16.8 82.4 0.8	1 5	98.4 1.6	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-27 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EGR SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	EGR SUBSYSTEM																	
		EGR VALVE		EGR VALVE TRANSDUCER		EGR TIME DELAY SOLENOID (CHRYSLER)		VENTURI VACUUM AMPLIFIER (CHRYSLER) (FORD)		HIGH-SPEED MODULATOR (FORD)		VACUUM RESERVOIR (FORD)		COOLANT TEMPERATURE VACUUM SWITCHES		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	44	1 3	100.0 0.0	1 3 6	34.1 65.9 0.0	1 3	4.6 95.4	1 3	9.1 90.9	1 3	0.0 100.0	1 3	11.4 88.6	1 3 6	50.0 47.7 2.3	1 3	100.0 0.0	1 3	0.0 100.0
DETROIT	49	1 3	98.0 2.0	1 3 6	22.5 71.4 6.1	1 3	4.1 95.9	1 3	12.2 87.8	1 3	4.1 95.9	1 3	14.3 85.7	1 3 6	77.5 22.5 0.0	1 3	91.8 8.2	1 3	2.0 98.0
WASHINGTON	32	1 3	100.0 0.0	1 3 6	15.6 81.3 3.1	1 3	6.2 93.8	1 3	15.6 84.4	1 3	0.0 100.0	1 3	6.2 93.8	1 3 6	68.7 31.3 0.0	1 3	100.0 0.0	1 3	0.0 100.0
TOTAL	125	1 3	99.2 0.8	1 3 6	24.8 72.0 3.2	1 3	4.8 95.2	1 3	12.0 88.0	1 3	1.6 98.4	1 3	11.2 88.8	1 3 6	65.6 33.6 0.8	1 3	96.8 3.2	1 3	0.8 99.2

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-28 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE EGR SYSTEM BY MANUFACTURER FOR VEHICLES PASSING THE INITIAL TEST

MANUFACTURER	# CARS	EGR SUBSYSTEM																	
		EGR VALVE		EGR VALVE TRANSDUCER		EGR TIME DELAY SOLENOID (CHRYSLER)		VENTURI VACUUM AMPLIFIER (CHRYSLER) (FORD)		HIGH-SPEED MODULATOR (FORD)		VACUUM RESERVOIR (FORD)		COOLANT TEMPERATURE VACUUM SWITCHES		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1 3	100.0 0.0	1 3 6	7.8 90.2 2.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3 6	76.5 21.6 1.9	1 3	98.0 2.0	1 3	0.0 100.0
FORD	57	1 3	100.0 0.0	1 3 6	47.4 47.4 5.2	1 3	0.0 100.0	1 3	5.3 94.7	1 3	3.5 96.5	1 3	24.6 75.4	1 3 6	47.4 52.6 0.0	1 3	96.5 3.5	1 3	1.8 98.2
CHRYSLER	17	1 3	94.1 5.9	1 3 6	0.0 100.0 0.0	1 3	35.3 64.7	1 3	70.6 29.4	1 3	0.0 100.0	1 3	0.0 100.0	1 3 6	94.1 5.9 0.0	1 3	94.1 5.9	1 3	0.0 100.0
TOTAL	125	1 3	99.2 0.8	1 3 6	24.8 72.0 3.2	1 3	4.8 95.2	1 3	12.0 88.0	1 1	1.6 98.4	1 3	11.2 88.8	1 3 6	65.6 33.6 0.8	1 3	96.8 3.2	1 3	0.8 99.2

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-29 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE AIR PUMP SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	AIR PUMP SUBSYSTEM																			
		AIR PUMP		BYPASS VALVE, PUMP VALVE		CHECK VALVE		ELECTRIC PVS		SOLENOID VACUUM VALVE		FLOOR PAN SWITCH (FORD)		VACUUM DIFF. CONTROL		DRIVE BELT ATTACHING HDWE		HOSES, LINES, WIRES		OTHER AIR PUMP	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	44	1 3	47.7 52.3	1 3	47.7 52.3	1 3	47.7 52.3	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	4.6 95.4	1 3	47.7 52.3	1 3	50.0 50.0	3	100.0
DETROIT	49	1 3	49.0 51.0	1 3	49.0 51.0	1 3	49.0 51.0	1 3	6.1 93.9	1 3	6.1 93.9	1 3	4.1 95.9	1 3	42.9 57.1	1 3	49.0 51.0	1 3	49.0 51.0	3	100.0
WASHINGTON	32	1 3	40.6 59.4	1 3	40.6 59.4	1 3	40.6 59.4	1 3	6.2 93.8	1 3	15.6 84.4	1 3	3.1 96.9	1 3	12.5 87.5	1 3	40.6 59.4	1 3	40.6 59.4	3	100.0
TOTAL	125	1 3	46.4 53.6	1 3	46.4 53.6	1 3	46.4 53.6	1 3	4.0 96.0	1 3	6.4 93.6	1 3	2.4 97.6	1 3	21.6 78.4	1 3	46.4 53.6	1 3	47.2 52.8	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-30 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE AIR PUMP SYSTEM BY MANUFACTURER FOR VEHICLES PASSING THE INITIAL TEST

MANUFAC TURER	# CARS	AIR PUMP SUBSYSTEM																			
		AIR PUMP		BYPASS VALVE, PUMP VALVE		CHECK VALVE		ELECTRIC PVS		SOLENOID VACUUM VALVE		FLOOR PAN SWITCH (FORD)		VACUUM DIFF. CONTROL		DRIVE BELT ATTACHING HOWE		HOSES, LINES, WIRES		OTHER AIR PUMP	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1 3	2.0 98.0	1 3	2.0 98.0	1 3	2.0 98.0	1 3	2.0 98.0	1 3	2.0 98.0	1 3	0.0 100.0	1 3	2.0 98.0	1 3	2.0 98.0	1 3	3.9 96.1	3	100.0
FORD	57	1 3	100.0 0.0	1 3	100.0 0.0	1 3	100.0 0.0	1 3	7.0 93.0	1 3	12.3 87.7	1 3	5.3 94.7	1 3	45.6 54.4	1 3	100.0 0.0	1 3	100.0 0.0	3	100.0
CHRYSLER	17	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	3	100.0
TOTAL	125	1 3	46.4 53.6	1 3	46.4 53.6	1 3	46.4 53.6	1 3	4.0 96.0	1 3	6.4 93.6	1 3	2.4 97.6	1 3	21.6 78.4	1 3	46.4 53.6	1 3	47.2 52.8	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-31 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE PCV SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	PCV SUBSYSTEM							
		PCV VALVE		FILTERS		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	44	1	97.7	1	97.7	1	97.7	3	100.0
		3	2.3	3	2.3	3	2.3		
						5	0.0		
DETROIT	49	1	100.0	1	100.0	1	98.0	3	100.0
		3	0.0	3	0.0	3	0.0		
						5	2.0		
WASHINGTON	32	1	100.0	1	100.0	1	100.0	3	100.0
		3	0.0	3	0.0	3	0.0		
						5	0.0		
TOTAL	125	1	99.2	1	99.2	1	98.4	3	100.0
		3	0.8	3	0.8	3	0.8		
						5	0.8		

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-32 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE PCV SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST

MANUFACTURER	# CARS	PCV SUBSYSTEM							
		PCV VALVE		FILTERS		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	98.0	1	98.0	1	98.0	3	100.0
		3	2.0	3	2.0	3	2.0		
						5	0.0		
FORD	57	1	100.0	1	100.0	1	98.2	3	100.0
		3	0.0	3	0.0	3	0.0		
						5	1.8		
CHRYSLER	17	1	100.0	1	100.0	1	100.0	3	100.0
		3	0.0	3	0.0	3	0.0		
						5	0.0		
TOTAL	125	1	99.2	1	99.2	1	99.4	3	100.0
		3	0.8	3	0.8	3	0.8		
						5	0.8		

*PERFORMANCE CODE:	
0	NOT KNOWN IF EQUIPPED
1	NO MALPERFORMANCE
2	NOT USED IN THIS PROGRAM
3	NOT APPLICABLE
4	MALADJUSTED
5	DISABLED
6	DEFECTIVE
7	INADEQUATE OR IMPROPER MAINTENANCE
8	IMPROPER PART – MISBUILD
9	NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-33 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EXHAUST SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	EXHAUST SUBSYSTEM					
		EXHAUST MANIFOLD, MUFFLER		CATALYST		OTHER	
		CODE	%	CODE	%	CODE	%
CHICAGO	44	1	100.0	1	100.0	3	100.0
DETROIT	49	1	100.0	1	100.0	3	100.0
WASHINGTON	32	1	100.0	1	100.0	3	100.0
TOTAL	125	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-34 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EXHAUST SYSTEM BY MANUFACTURER FOR VEHICLES PASSING THE INITIAL TEST

MANUFAC-TURER	# CARS	EXHAUST SUBSYSTEM					
		EXHAUST MANIFOLD, MUFFLER		CATALYST		OTHER	
		CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	100.0	1	100.0	3	100.0
FORD	57	1	100.0	1	100.0	3	100.0
CHRYSLER	17	1	100.0	1	100.0	3	100.0
TOTAL	125	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-35 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EVAPORATION SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	EVAPORATION SUBSYSTEM							
		EVAPORATION CANISTER		CANISTER FILTER		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	44	1	100.0	1	100.0	1	100.0	3	100.0
DETROIT	49	1	100.0	1	100.0	1	100.0	3	100.0
WASHINGTON	32	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	125	1	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-36 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EVAPORATION SYSTEM BY MANUFACTURER FOR VEHICLES PASSING THE INITIAL TEST

MANUFACTURER	# CARS	EVAPORATION SUBSYSTEM							
		EVAPORATION CANISTER		CANISTER FILTER		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	100.0	1	100.0	1	100.0	3	100.0
FORD	57	1	100.0	1	100.0	1	100.0	3	100.0
CHRYSLER	17	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	125	1	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-37 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE ENGINE ASSEMBLY SYSTEM BY CITY FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	ENGINE ASSEMBLY SUBSYSTEM															
		ENGINE ASSEMBLY		ENGINE OIL & FILTER		COOLING SYSTEM		MECHANICAL VALVE ADJUST		CARBURETOR & INTAKE BOLTS		BELT TENSIONS		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	44	1	100.0	1	100.0	1	100.0	1 3	11.4 88.6	1	100.0	1	100.0	1	100.0	3	100.0
DETROIT	49	1	100.0	1	100.0	1	100.0	1 3	22.4 77.6	1	100.0	1	100.0	1	100.0	3	100.0
WASHINGTON	32	1	100.0	1	100.0	1	100.0	1 3	18.7 81.3	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	125	1	100.0	1	100.0	1	100.0	1 3	17.6 82.4	1	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-38 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE ENGINE ASSEMBLY SYSTEM BY MANUFACTURER FOR VEHICLES PASSING THE INITIAL TEST

MANUFAC-TURER	# CARS	ENGINE ASSEMBLY SUBSYSTEM															
		ENGINE ASSEMBLY		ENGINE OIL & FILTER		COOLING SYSTEM		MECHANICAL VALVE ADJUST		CARBURETOR & INTAKE BOLTS		BELT TENSIONS		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	100.0	1	100.0	1	100.0	1 3	9.8 90.2	1	100.0	1	100.0	1	100.0	3	100.0
FORD	57	1	100.0	1	100.0	1	100.0	1 3	15.8 84.2	1	100.0	1	100.0	1	100.0	3	100.0
CHRYSLER	17	1	100.0	1	100.0	1	100.0	1 3	47.1 52.9	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	125	1	100.0	1	100.0	1	100.0	1	17.6	1	100.0	1	100.0	1	100.0	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-39 FREQUENCY OF MALPERFORMANCE FOR ALL COMBINATIONS OF EMISSION SYSTEMS TWO AT A TIME FOR VEHICLES PASSING THE INITIAL TEST

CITY	# CARS	SYSTEM CODE*								
		1&2	1&3	1&4	1&5	1&6	1&7	1&8	1&9	—
CHICAGO	44	3	0	0	0	0	0	0	0	
DETROIT	49	3	0	1	0	0	0	0	0	
WASHINGTON	32	0	0	0	0	0	0	0	0	
TOTAL	125	6	0	1	0	0	0	0	0	
			2&3	2&4	2&5	2&6	2&7	2&8	2&9	
CHICAGO	44		3	1	0	0	0	0	0	
DETROIT	49		5	1	0	1	0	0	0	
WASHINGTON	32		1	0	0	0	0	0	0	
TOTAL	125		9	2	0	1	0	0	0	
				3&4	3&5	3&6	3&7	3&8	3&9	
CHICAGO	44			0	0	0	0	0	0	
DETROIT	49			0	0	0	0	0	0	
WASHINGTON	32			0	0	0	0	0	0	
TOTAL	125			0	0	0	0	0	0	
					4&5	4&6	4&7	4&8	4&9	
CHICAGO	44				0	0	0	0	0	
DETROIT	49				0	0	0	0	0	
WASHINGTON	32				0	0	0	0	0	
TOTAL	125				0	0	0	0	0	
						5&6	5&7	5&8	5&9	
CHICAGO	44					0	0	0	0	
DETROIT	49					0	0	0	0	
WASHINGTON	32					0	0	0	0	
TOTAL	125					0	0	0	0	
							6&7	6&8	6&9	
CHICAGO	44						0	0	0	
DETROIT	49						0	0	0	
WASHINGTON	32						0	0	0	
TOTAL	125						0	0	0	
								7&8	7&9	
CHICAGO	44							0	0	
DETROIT	49							0	0	
WASHINGTON	32							0	0	
TOTAL	125							0	0	
									8&9	
CHICAGO	44								0	
DETROIT	49								0	
WASHINGTON	32								0	
TOTAL	125								0	

*SYSTEM CODE:
1 - INDUCTION SYSTEM
2 - CARBURETOR/FUEL
3 - IGNITION
4 - EXHAUST GAS RECIRCULATION
5 - AIR PUMP
6 - PCV
7 - EXHAUST
8 - EVAPORATION
9 - ENGINE ASSEMBLY

TABLE A-40 FREQUENCY OF MALPERFORMANCE FOR ALL COMBINATIONS OF EMISSIONS SYSTEMS TWO AT A TIME FOR VEHICLES PASSING THE INITIAL TEST

MANUFAC-TURER	# CARS	SYSTEM CODE*								
		1 & 2	1 & 3	1 & 4	1 & 5	1 & 6	1 & 7	1 & 8	1 & 9	--
GM	51	0	0	0	0	0	0	0	0	
FORD	57	4	0	1	0	0	0	0	0	
CHRYSLER	17	2	0	0	0	0	0	0	0	
TOTAL	125	6	0	1	0	0	0	0	0	
			2 & 3	2 & 4	2 & 5	2 & 6	2 & 7	2 & 8	2 & 9	
GM	51		2	1	0	0	0	0	0	
FORD	57		6	1	0	1	0	0	0	
CHRYSLER	17		1	0	0	0	0	0	0	
TOTAL	125		9	2	0	1	0	0	0	
				3 & 4	3 & 5	3 & 6	3 & 7	3 & 8	3 & 9	
GM	51			0	0	0	0	0	0	
FORD	57			0	0	0	0	0	0	
CHRYSLER	17			0	0	0	0	0	0	
TOTAL	125			0	0	0	0	0	0	
					4 & 5	4 & 6	4 & 7	4 & 8	4 & 9	
GM	51				0	0	0	0	0	
FORD	57				0	0	0	0	0	
CHRYSLER	17				0	0	0	0	0	
TOTAL	125				0	0	0	0	0	
						5 & 6	5 & 7	5 & 8	5 & 9	
GM	51					0	0	0	0	
FORD	57					0	0	0	0	
CHRYSLER	17					0	0	0	0	
TOTAL	125					0	0	0	0	
							6 & 7	6 & 8	6 & 9	
GM	51						0	0	0	
FORD	57						0	0	0	
CHRYSLER	17						0	0	0	
TOTAL	125						0	0	0	
								7 & 8	7 & 9	
GM	51							0	0	
FORD	57							0	0	
CHRYSLER	17							0	0	
TOTAL	125							0	0	
									8 & 9	
GM	51								0	
FORD	57								0	
CHRYSLER	17								0	
TOTAL	125								0	

*SYSTEM CODE:
1 - INDUCTION SYSTEM
2 - CARBURETOR/FUEL
3 - IGNITION
4 - EXHAUST GAS RECIRCULATION
5 - AIR PUMP
6 - PCV
7 - EXHAUST
8 - EVAPORATION
9 - ENGINE ASSEMBLY

TABLE A-41 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE INDUCTION SYSTEM BY CITY FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	INDUCTION SUBSYSTEM													
		HEATED AIR INLET DOOR		HEATED AIR INLET DIAPHRAGM		TEMPERATURE SENSORS		DELAY VALVE (FORD)		AIR FILTER ELEMENT		HOSES, TUBES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	56	1 6	100.0 0.0	1 6	98.2 1.8	0 1 6	0.0 98.2 1.8	3	100.0	1	100.0	1 5	94.6 5.4	3 5	100.0 0.0
DETROIT	51	1 6	98.0 2.0	1 6	100.0 0.0	0 1 6	0.0 100.0 0.0	3	100.0	1	100.0	1 5	98.0 2.0	3 5	100.0 0.0
WASHINGTON	68	1 6	100.0 0.0	1 6	100.0 0.0	0 1 6	1.5 98.5 0.0	3	100.0	1	100.0	1 5	95.6 4.4	3 5	98.5 1.5
TOTAL	175	1 6	99.4 0.6	1 6	99.4 0.6	0 1 6	0.6 98.8 0.6	3	100.0	1	100.0	1 5	96.0 4.0	3 5	99.4 0.6

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-42 PERCENT OF VEHICLES WITH EACH TYPE OF
PERFORMANCE* FOR THE INDUCTION SYSTEM BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST

MANUFAC-TURER	# CARS	INDUCTION SUBSYSTEM													
		HEATED AIR INLET DOOR		HEATED AIR INLET DIAPHRAGM		TEMPERATURE SENSORS		DELAY VALVE (FORD)		AIR FILTER ELEMENT		HOSES, TUBES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1 6	98.0 2.0	1 6	100.0 0.0	0 1 6	0.0 100.0 0.0	3	100.0	1	100.0	1 5	98.0 2.0	3 5	100.0 0.0
FORD	42	1 6	100.0 0.0	1 6	97.6 2.4	0 1 6	0.0 100.0 0.0	3	100.0	1	100.0	1 5	95.2 4.8	3 5	100.0 0.0
CHRYSLER	82	1 6	100.0 0.0	1 6	100.0 0.0	0 1 6	1.2 97.6 1.2	3	100.0	1	100.0	1 5	95.1 4.9	3 5	98.8 1.2
TOTAL	175	1 6	99.4 0.6	1 6	99.4 0.6	0 1 6	0.6 98.8 0.6	3	100.0	1	100.0	1 5	96.0 4.0	3 5	99.4 0.6

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-43 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY CITY FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CARBURETOR ASSEMBLY		LIMITER CAPS		IDLE MIXTURE ADJUST		IDLE SPEED		EXTERNAL IDLE ENRICH		IDLE STOP ASSEMBLY		DASHPOT AND THROTTLE		FUEL FILTER		HOSES, LINES, WIRES FOR FUEL		OTHER FUEL	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	56	1 5 6	96.4 1.8 1.8	1 5	33.9 66.1	1 4	35.7 64.3	1 4	87.5 12.5	1 3 5 6	26.8 71.4 0.0 1.8	1 3	8.9 91.1	1 3 6	1.8 98.2 0.0	1 3	98.2 1.8	1 5	98.2 1.8	3	100.0
DETROIT	51	1 5 6	100.0 0.0 0.0	1 5	43.1 56.9	1 4	39.2 60.8	1 4	54.9 45.1	1 3 5 6	29.4 70.6 0.0 0.0	1 3	13.7 86.3	1 3 6	0.0 100.0 0.0	1 3	100.0 0.0	1 5	98.0 2.0	3	100.0
WASHINGTON	68	1 5 6	97.0 1.5 1.5	1 5	32.3 67.7	1 4	48.5 51.5	1 4	67.6 32.4	1 3 5 6	23.5 73.5 1.5 1.5	1 3	13.2 86.8	1 3 6	0.0 98.5 1.5	1 3	100.0 0.0	1 5	100.0 0.0	3	100.0
TOTAL	175	1 5 6	97.7 1.1 1.1	1 5	36.0 64.0	1 4	41.7 58.3	1 4	70.3 29.7	1 3 5 6	26.3 72.0 0.6 1.1	1 3	12.0 88.0	1 3 6	0.6 98.8 0.6	1 3	99.4 0.6	1 5	98.9 1.1	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-43 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY CITY FOR VEHICLES FAILING THE INITIAL TEST (cont.)

CITY	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CHOKE ADJUST		VACUUM DIAPHRAGM		ELECTRICAL CONTROLS		CHOKE, LINES, WIRES		EXHAUST HEAT CONTROL		ACTUATING DIAPHRAGM		COOLANT TEMPERATURE SWITCHES		CHECK VALVE		HOSES, LINES, WIRES FOR CHOKE		OTHER CHOKE	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	56	1 4	92.9 7.1	1 3 6	92.8 5.4 1.8	1 3 5 6	69.6 28.6 0.0 1.8	1 5 6	96.4 1.8 1.8	1 3	26.8 73.2	1 3	16.1 83.9	1 3	16.1 83.9	1 3	1.8 98.2	1 3 5	30.4 67.9 1.7	3	100.0
DETROIT	51	1 4	74.5 25.5	1 3 6	96.1 0.0 3.9	1 3 5 6	62.7 33.3 2.0 2.0	1 5 6	96.1 3.9 0.0	1 3	35.3 64.7	1 3	19.6 80.4	1 3	19.6 80.4	1 3	5.9 94.1	1 3 5	41.2 58.8 0.0	3	100.0
WASHINGTON	68	1 4	94.1 5.9	1 3 6	97.1 1.5 1.4	1 3 5 6	70.6 25.0 0.0 4.4	1 5 6	98.5 1.5 0.0	1 3	32.3 67.7	1 3	20.6 79.4	1 3	19.1 80.9	1 3	1.5 98.5	1 3 5	38.2 61.8 0.0	3	100.0
TOTAL	175	1 4	88.0 12.0	1 3 6	95.4 2.3 2.3	1 3 5 6	68.0 28.6 0.6 2.8	1 5 6	97.1 2.3 0.6	1 3	31.4 68.6	1 3	18.9 81.1	1 3	18.3 81.7	1 3	2.9 97.1	1 3 5	36.6 62.9 0.5	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-44 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST

MANUFACTURER	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CARBURETOR ASSEMBLY		LIMITER CAPS		IDLE MIXTURE ADJUST		IDLE SPEED		EXTERNAL IDLE ENRICH		IDLE STOP ASSEMBLY		DASHPOT AND THROTTLE		FUEL FILTER		HOSES, LINES, WIRES FOR FUEL		OTHER FUEL	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	100.0	1	43.1	1	47.1	1	74.5	1	0.0	1	9.8	1	2.0	1	100.0	1	100.0	3	100.0
		5	0.0	5	56.9	4	52.9	4	25.5	3	100.0	3	90.2	3	98.0	3	0.0	5	0.0		
		6	0.0							5	0.0			6	0.0						
										6	0.0										
FORD	42	1	97.6	1	47.6	1	78.6	1	69.1	1	0.0	1	23.8	1	0.0	1	97.6	1	100.0	3	100.0
		5	2.4	5	52.4	4	21.4	4	30.9	3	100.0	3	76.2	3	100.0	3	2.4	5	0.0		
		6	0.0							5	0.0			6	0.0						
										6	0.0										
CHRYSLER	82	1	96.3	1	25.6	1	19.5	1	68.3	1	56.1	1	7.3	1	0.0	1	100.0	1	97.6	3	100.0
		5	1.2	5	74.4	4	80.5	4	31.7	3	40.2	3	92.7	3	98.8	3	0.0	5	2.4		
		6	2.5							5	1.2			6	1.2						
										6	2.5										
TOTAL	175	1	97.7	1	36.0	1	41.7	1	70.3	1	26.3	1	12.0	1	0.6	1	99.4	1	98.9	3	100.0
		5	1.1	5	64.0	4	58.3	4	29.7	3	72.0	3	88.0	3	98.8	3	0.6	5	1.1		
		6	1.2							5	0.6			6	0.6						
										6	1.1										

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-44 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE CARBURETOR FUEL/SYSTEM BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST (cont.)

MANUFACTURER	# CARS	CHOKE ADJUST		CARBURETOR/FUEL SUBSYSTEM																	
				VACUUM DIAPHRAGM		ELECTRICAL CONTROLS		CHOKE, LINES, WIRES		EXHAUST HEAT CONTROL		ACTUATING DIAPHRAGM		COOLANT TEMPERATURE SWITCHES		CHECK VALVE		HOSES, LINES, WIRES FOR CHOKE		OTHER CHOKE	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1 4	78.4 21.6	1 3 6	98.0 0.0 2.0	1 3 5 6	3.9 94.1 0.0 2.0	1 5 6	94.1 3.9 2.0	1 3	52.9 47.1	1 3	52.9 47.1	1 3	51.0 49.0	1 3	9.8 90.2	1 3 5	58.8 39.2 2.0	3	100.0
FORD	42	1 4	97.6 2.4	1 3 6	90.5 7.1 2.4	1 3 5 6	95.2 4.8 0.0 0.0	1 5 6	100.0 0.0 0.0	1 3	14.3 85.7	1 3	14.3 85.7	1 3	14.3 85.7	1 3	0.0 100.0	1 3 5	26.2 73.8 0.0	3	100.0
CHRYSLER	82	1 4	89.0 11.0	1 3 6	96.3 1.2 2.5	1 3 5 6	93.9 0.0 1.2 4.9	1 5 6	97.6 2.4 0.0	1 3	26.8 73.2	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3 5	28.0 72.0 0.0	3	100.0
TOTAL	175	1 4	88.0 12.0	1 3 6	95.4 2.3 2.3	1 3 5 6	68.0 28.6 0.6 2.8	1 5 6	97.1 2.3 0.6	1 3	31.4 68.6	1 3	18.9 81.1	1 3	18.3 81.7	1 3	2.9 97.1	1 3 5	36.6 62.8 0.6	3	100.0

*PERFORMANCE CODE:

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1 - NO MALPERFORMANCE
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4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-45 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE IGNITION SYSTEM BY CITY FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	IGNITION SUBSYSTEM															
		DISTRIBUTOR		INITIAL TIMING		SPARK PLUGS/ WIRES		VACUUM ADVANCE		SPARK DELAY DEVICES		COOLANT TEMPERATURE SWITCHES		OTHER HOSES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	56	1 6 7	98.2 1.8 0.0	1 4	83.9 16.1	1 6 8	100.0 0.0 0.0	1 3 6	94.6 1.8 3.6	1 3 5 6	33.9 66.1 0.0 0.0	1 3	30.4 69.6	1 5	92.9 7.1	3	100.0
DETROIT	51	1 6 7	94.1 3.9 2.0	1 4	74.5 25.5	1 6 8	100.0 0.0 0.0	1 3 6	100.0 0.0 0.0	1 3 5 6	21.6 74.5 2.0 1.9	1 3	25.5 74.5	1 5	98.0 2.0	3	100.0
WASHINGTON	68	1 6 7	98.5 1.5 0.0	1 4	66.2 33.8	1 6 8	92.6 4.4 3.0	1 3 6	100.0 0.0 0.0	1 3 5 6	26.5 72.1 0.0 1.4	1 3	29.4 70.6	1 5	95.6 4.4	3	100.0
TOTAL	175	1 6 7	97.1 2.3 0.6	1 4	74.3 25.7	1 6 8	97.1 1.7 1.2	1 3 6	98.3 0.6 1.1	1 3 5 6	27.4 70.9 0.6 1.1	1 3	28.6 71.4	1 5	95.4 4.6	3	100.0

*PERFORMANCE CODE:

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5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-46 PERCENT OF VEHICLES WITH EACH TYPE OF

PERFORMANCE* FOR THE IGNITION SYSTEM BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST

MANUFAC-TURER	# CARS	IGNITION SUBSYSTEM															
		DISTRIBUTOR		INITIAL TIMING		SPARK PLUGS/ WIRES		VACUUM ADVANCE		SPARK DELAY DEVICES		COOLANT TEMPERATURE SWITCHES		OTHER HOSES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1 6 7	100.0 0.0 0.0	1 4	70.6 29.4	1 6 8	100.0 0.0 0.0	1 3 6	100.0 0.0 0.0	1 3 5 6	21.6 78.4 0.0 0.0	1 3	35.3 64.7	1 5	98.0 2.0	3	100.0
FORD	42	1 6 7	95.2 2.4 2.4	1 4	71.4 28.6	1 6 8	95.2 4.8 0.0	1 3 6	100.0 0.0 0.0	1 3 5 6	19.0 80.9 0.0 0.0	1 3	28.6 71.4	1 5	97.6 2.4	3	100.0
CHRYSLER	82	1 6 7	96.3 3.7 0.0	1 4	78.0 22.0	1 6 8	96.3 1.2 2.5	1 3 6	96.3 1.2 2.5	1 3 5 6	35.4 61.0 1.2 2.4	1 3	24.4 75.6	1 5	92.7 7.3	3	100.0
TOTAL	175	1 6 7	97.1 2.3 0.6	1 4	74.3 25.7	1 6 8	97.2 1.7 1.1	1 3 6	98.3 0.6 1.1	1 3 5 6	27.4 70.9 0.6 1.1	1 3	28.5 71.4	1 5	95.4 4.6	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
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3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
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7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-47 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EGR SYSTEM BY CITY FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	EGR SUBSYSTEM																	
		EGR VALVE		EGR VALVE TRANSDUCER		EGR TIME DELAY SOLENOID (CHRYSLER)		VENTURI VACUUM AMPLIFIER (CHRYSLER) (FORD)		HIGH-SPEED MODULATOR (FORD)		VACUUM RESERVOIR (FORD)		COOLANT TEMPERATURE VACUUM SWITCHES		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	56	1 3 5 6	85.7 0.0 10.7 3.6	1 3 6	10.7 87.5 1.8	1 3 6	12.5 85.7 1.8	1 3	33.9 66.1	3	100.0	1 3	3.6 96.4	1 3 5	87.5 12.5 0.0	1 3 5 6	87.5 0.0 12.5 0.0	3	100.0
DETROIT	51	1 3 5 6	98.0 2.0 0.0 0.0	1 3 6	13.7 80.4 5.9	1 3 6	25.5 74.5 0.0	1 3	33.3 66.7	3	100.0	1 3	0.0 100.0	1 3 5	84.3 15.7 0.0	1 3 5 6	84.3 2.0 11.7 2.0	3	100.0
WASHINGTON	68	1 3 5 6	97.0 0.0 1.5 1.5	1 3 6	14.7 76.5 8.8	1 3 6	17.6 80.9 1.5	1 3	44.1 55.9	3	100.0	1 3	1.5 98.5	1 3 5	85.3 13.2 1.5	1 3 5 6	86.8 2.9 10.3 0.0	3	100.0
TOTAL	175	1 3 5 6	93.7 0.6 4.0 1.7	1 3 6	13.1 81.2 5.7	1 3 6	18.3 80.6 1.1	1 3	37.7 62.3	3	100.0	1 3	1.7 98.3	1 3 5	85.7 13.7 0.6	1 3 5 6	86.3 1.7 11.4 0.6	3	100.0

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5 - DISABLED
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8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-48 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EGR SYSTEM BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST

MANUFACTURER	# CARS	EGR SUBSYSTEM																	
		EGR VALVE		EGR VALVE TRANSDUCER		EGR TIME DELAY SOLENOID (CHRYSLER)		VENTURI VACUUM AMPLIFIER (CHRYSLER) (FORD)		HIGH-SPEED MODULATOR (FORD)		VACUUM RESERVOIR (FORD)		COOLANT TEMPERATURE VACUUM SWITCHES		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1 3 5 6	100.0 0.0 0.0 0.0	1 3 6	3.9 94.1 2.0	1 3 6	0.0 100.0 0.0	1 3	0.0 100.0	3	100.0	1 3	0.0 100.0	1 3 5	80.4 19.6 0.0	1 3 5 6	84.3 2.0 13.7 0.0	3	100.0
FORD	42	1 3 5 6	97.6 0.0 0.0 2.4	1 3 6	50.0 28.6 21.4	1 3 6	0.0 100.0 0.0	1 3	4.8 95.2	3	100.0	1 3	7.1 92.9	1 3 5	69.0 31.0 0.0	1 3 5 6	85.7 2.4 9.5 2.4	3	100.0
CHRYSLER	82	1 3 5 6	87.8 1.2 8.5 2.5	1 3 6	0.0 100.0 0.0	1 3 6	39.0 58.5 2.5	1 3	78.0 22.0	3	100.0	1 3	0.0 100.0	1 3 5	97.6 1.2 1.2	1 3 5 6	87.8 1.2 11.0 0.0	3	100.0
TOTAL	175	1 3 5 6	93.7 0.6 4.0 1.7	1 3 6	13.2 81.1 5.7	1 3 6	18.3 80.6 1.1	1 3	37.7 62.3	3	100.0	1 3	1.7 98.3	1 3 5	85.7 13.7 0.6	1 3 5 6	86.3 1.7 11.4 0.6	3	100.0

***PERFORMANCE CODE:**

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8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-49 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE AIR PUMP SYSTEM BY CITY FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	AIR PUMP SUBSYSTEM																			
		AIR PUMP		BYPASS VALVE, PUMP VALVE		CHECK VALVE		ELECTRIC PVS		SOLENOID VACUUM VALVE		FLOOR PAN SWITCH (FORD)		VACUUM DIFF. CONTROL		DRIVE BELT ATTACHING HOWE		HOSES, LINES, WIRES		OTHER AIR PUMP	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	56	1 3	23.2 76.8	1 3	23.2 76.8	1 3	23.2 76.8	1 3	1.8 98.2	1 3	3.6 96.4	3	100.0	1 3	5.4 94.6	1 3	23.2 76.8	1 3 5	23.2 76.8 0.0	3	100.0
DETROIT	51	1 3	19.6 80.4	1 3	19.6 80.4	1 3	19.6 80.4	1 3	0.0 100.0	1 3	0.0 100.0	3	100.0	1 3	17.6 82.4	1 3	19.6 80.4	1 3 5	15.7 80.4 3.9	3	100.0
WASHINGTON	68	1 3	32.3 67.7	1 3	32.4 67.6	1 3	32.4 67.6	1 3	1.5 98.5	1 3	1.5 98.5	3	100.0	1 3	0.0 100.0	1 3	32.3 67.7	1 3 5	32.3 67.7 0.0	3	100.0
TOTAL	175	1 3	25.7 74.3	1 3	25.7 74.3	1 3	25.7 74.3	1 3	1.1 98.9	1 3	1.7 98.3	3	100.0	1 3	6.9 93.1	1 3	25.7 74.3	1 3 5	24.6 74.3 1.1	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
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3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-50 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE AIR PUMP SYSTEM BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST

MANUFACTURER	# CARS	AIR PUMP SUBSYSTEM																			
		AIR PUMP		BYPASS VALVE, PUMP VALVE		CHECK VALVE		ELECTRIC PVS		SOLENOID VACUUM VALVE		FLOOR PAN SWITCH (FORD)		VACUUM DIFF. CONTROL		DRIVE BELT ATTACHING HOWE		HOSES, LINES, WIRES		OTHER AIR PUMP	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	3	100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3 5	0.0 100.0 0.0	3	100.0
FORD	42	1 3	100.0 0.0	1 3	100.0 0.0	1 3	100.0 0.0	1 3	4.8 95.2	1 3	7.1 92.9	3	100.0	1 3	28.6 71.4	1 3	100.0 0.0	1 3 5	95.2 0.0 4.8	3	100.0
CHRYSLER	82	1 3	3.7 96.3	1 3	3.7 96.3	1 3	3.7 96.3	1 3	0.0 100.0	1 3	0.0 100.0	3	100.0	1 3	0.0 100.0	1 3	3.7 96.3	1 3 5	3.7 96.3 0.0	3	100.0
TOTAL	175	1 3	25.7 74.3	1 3	25.7 74.3	1 3	25.7 74.3	1 3	1.1 98.9	1 3	1.7 98.3	3	100.0	1 3	6.9 93.1	1 3	25.7 74.3	1 3 5	24.6 74.3 1.1	3	100.0

*PERFORMANCE CODE:

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1 - NO MALPERFORMANCE
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4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-51 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE PCV SYSTEM BY CITY FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	PCV SUBSYSTEM							
		PCV VALVE		FILTERS		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	56	1	100.0	1	100.0	1 5	98.2 1.8	3	100.0
DETROIT	51	1	100.0	1	100.0	1 5	100.0 0.0	3	100.0
WASHINGTON	68	1	100.0	1	100.0	1 5	100.0 0.0	3	100.0
TOTAL	175	1	100.0	1	100.0	1 5	99.4 0.6	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
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3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-52 PERCENT FOR EACH TYPE OF PERFORMANCE* FOR THE PCV SYSTEM BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST

MANUFACTURER	# CARS	PCV SUBSYSTEM							
		PCV VALVE		FILTERS		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	100.0	1	100.0	1 5	100.0 0.0	3	100.0
FORD	42	1	100.0	1	100.0	1 5	100.0 0.0	3	100.0
CHRYSLER	82	1	100.0	1	100.0	1 5	98.8 1.2	3	100.0
TOTAL	175	1	100.0	1	100.0	1 5	99.4 0.6	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-53 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EXHAUST SYSTEM BY CITY FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	EXHAUST SUBSYSTEM					
		EXHAUST MANIFOLD, MUFFLER		CATALYST		OTHER	
		CODE	%	CODE	%	CODE	%
CHICAGO	56	1	100.0	1 3	98.2 1.8	3	100.0
DETROIT	51	1	100.0	1 3	96.1 3.9	3	100.0
WASHINGTON	68	1	100.0	1 3	95.6 4.4	3	100.0
TOTAL	175	1	100.0	1 3	96.6 3.4	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-54 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EXHAUST SYSTEM BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST

MANUFACTURER	# CARS	EXHAUST SUBSYSTEM					
		EXHAUST MANIFOLD, MUFFLER		CATALYST		OTHER	
		CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	100.0	1 3	100.0 0.0	3	100.0
FORD	42	1	100.0	1 3	95.2 4.8	3	100.0
CHRYSLER	82	1	100.0	1 3	95.1 4.9	3	100.0
TOTAL	175	1	100.0	1 3	96.6 3.4	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-55 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE EVAPORATION SYSTEM BY CITY FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	EVAPORATION SUBSYSTEM							
		EVAPORATION CANISTER		CANISTER FILTER		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	56	1	100.0	1 6	98.2 1.8	1 5 6	98.2 1.8 0.0	3	100.0
DETROIT	51	1	100.0	1 6	100.0 0.0	1 5 6	96.0 2.0 2.0	3	100.0
WASHINGTON	68	1	100.0	1 6	100.0 0.0	1 5 6	100.0 0.0 0.0	3	100.0
TOTAL	175	1	100.0	1 6	99.4 0.6	1 5 6	98.3 1.1 0.6	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-56 PERCENT FOR EACH TYPE OF PERFORMANCE* FOR THE EVAPORATION SYSTEM BY MANUFACTURER FOR FOR VEHICLES FAILING THE INITIAL TEST

MANUFAC-TURER	# CARS	EVAPORATION SUBSYSTEM							
		EVAPORATION CANISTER		CANISTER FILTER		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	100.0	1 6	100.0 0.0	1 5 6	98.0 0.0 2.0	3	100.0
FORD	42	1	100.0	1 6	100.0 0.0	1 5 6	97.6 2.4 0.0	3	100.0
CHRYSLER	82	1	100.0	1 6	98.8 1.2	1 5 6	98.8 1.2 0.0	3	100.0
TOTAL	175	1	100.0	1 6	99.4 0.6	1 5 6	98.3 1.1 0.6	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-57 PERCENT OF VEHICLES WITH EACH TYPE OF PERFORMANCE* FOR THE ENGINE ASSEMBLY SYSTEM BY CITY FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	ENGINE ASSEMBLY SUBSYSTEM															
		ENGINE ASSEMBLY		ENGINE OIL & FILTER		COOLING SYSTEM		MECHANICAL VALVE ADJUST		CARBURETOR & INTAKE BOLTS		BELT TENSIONS		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	55	1	100.0	1 7	100.0 0.0	1 6	100.0 0.0	1 3	25.0 75.0	1	100.0	1	100.0	1	100.0	3	100.0
DETROIT	25	1	100.0	1 7	96.1 3.9	1 6	98.0 2.0	1 3	13.7 86.3	1	100.0	1	100.0	1	100.0	3	100.0
WASHINGTON	66	1	100.0	1 7	100.0 0.0	1 6	100.0 0.0	1 3	19.1 80.9	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	146	1	100.0	1 7	98.9 1.1	1 6	99.4 0.6	1 3	19.4 80.6	1	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-58 PERCENT FOR EACH TYPE OF PERFORMANCE* BY THE ENGINE ASSEMBLY SYSTEM BY MANUFACTURER FOR VEHICLES FAILING THE INITIAL TEST

MANUFACTURER	# CARS	ENGINE ASSEMBLY SUBSYSTEM															
		ENGINE ASSEMBLY		ENGINE OIL & FILTER		COOLING SYSTEM		MECHANICAL VALVE ADJUST		CARBURETOR & INTAKE BOLTS		BELT TENSIONS		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	51	1	100.0	1 7	100.0 0.0	1 6	100.0 0.0	1 3	2.0 98.0	1	100.0	1	100.0	1	100.0	3	100.0
FORD	42	1	100.0	1 7	95.2 4.8	1 6	100.0 0.0	1 3	4.8 95.2	1	100.0	1	100.0	1	100.0	3	100.0
CHRYSLER	82	1	100.0	1 7	100.0 0.0	1 6	98.8 1.2	1 3	37.8 62.2	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	175	1	100.0	1 7	98.9 1.7	1 6	99.4 0.6	1 3	19.4 80.6	1	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-59 FREQUENCY OF MALPERFORMANCE FOR ALL COMBINATIONS OF EMISSION SYSTEMS TWO AT A TIME FOR VEHICLES FAILING THE INITIAL TEST

CITY	# CARS	SYSTEM CODE*								
		1 & 2	1 & 3	1 & 4	1 & 5	1 & 6	1 & 7	1 & 8	1 & 9	--
CHICAGO	56	4	2	0	0	0	0	2	0	
DETROIT	51	2	0	0	0	0	0	0	0	
WASHINGTON	68	3	3	2	0	0	0	0	0	
TOTAL	175	9	5	2	0	0	0	2	0	
			2 & 3	2 & 4	2 & 5	2 & 6	2 & 7	2 & 8	2 & 9	
CHICAGO	56		11	11	0	1	0	1	0	
DETROIT	51		17	6	2	0	0	2	3	
WASHINGTON	68		28	16	0	0	0	0	0	
TOTAL	175		56	33	2	1	0	3	3	
				3 & 4	3 & 5	3 & 6	3 & 7	3 & 8	3 & 9	
CHICAGO	56			5	0	0	0	2	0	
DETROIT	51			3	0	0	0	1	1	
WASHINGTON	68			8	0	0	0	0	0	
TOTAL	175			16	0	0	0	3	1	
					4 & 5	4 & 6	4 & 7	4 & 8	4 & 9	
CHICAGO	56				0	0	0	0	0	
DETROIT	51				2	0	0	0	1	
WASHINGTON	68				0	0	0	0	0	
TOTAL	175				2	0	0	0	1	
						5 & 6	5 & 7	5 & 8	5 & 9	
CHICAGO	56					0	0	0	0	
DETROIT	51					0	0	0	1	
WASHINGTON	68					0	0	0	0	
TOTAL	175					0	0	0	1	
							6 & 7	6 & 8	6 & 9	
CHICAGO	56						0	0	0	
DETROIT	51						0	0	0	
WASHINGTON	68						0	0	0	
TOTAL	175						0	0	0	
								7 & 8	7 & 9	
CHICAGO	56							0	0	
DETROIT	51							0	0	
WASHINGTON	68							0	0	
TOTAL	175							0	0	
									8 & 9	
CHICAGO	56								0	
DETROIT	51								1	
WASHINGTON	68								0	
TOTAL	175								1	

*SYSTEM CODE:
1 - INDUCTION SYSTEM
2 - CARBURETOR/FUEL
3 - IGNITION
4 - EXHAUST GAS RECIRCULATION
5 - AIR PUMP
6 - PCV
7 - EXHAUST
8 - EVAPORATION
9 - ENGINE ASSEMBLY

TABLE A-60 FREQUENCY OF MALPERFORMANCE FOR ALL COMBINATIONS OF EMISSIONS SYSTEMS TWO AT A TIME FOR VEHICLES FAILING THE INITIAL TEST

MANUFAC-TURER	# CARS	SYSTEM CODE*								
		1 & 2	1 & 3	1 & 4	1 & 5	1 & 6	1 & 7	1 & 8	1 & 9	—
GM	51	1	0	0	0	0	0	0	0	
FORD	42	3	2	1	0	0	0	1	0	
CHRYSLER	82	5	3	1	0	0	0	1	0	
TOTAL	175	9	5	2	0	0	0	2	0	
			2 & 3	2 & 4	2 & 5	2 & 6	2 & 7	2 & 8	2 & 9	
GM	51		14	4	0	0	0	1	0	
FORD	42		13	10	2	0	0	1	2	
CHRYSLER	82		29	19	0	1	0	1	1	
TOTAL	175		56	33	2	1	0	3	3	
				3 & 4	3 & 5	3 & 6	3 & 7	3 & 8	3 & 9	
GM	51			2	0	0	0	1	0	
FORD	42			5	0	0	0	1	1	
CHRYSLER	82			9	0	0	0	1	0	
TOTAL	175			16	0	0	0	3	1	
					4 & 5	4 & 6	4 & 7	4 & 8	4 & 9	
GM	51				0	0	0	0	0	
FORD	42				2	0	0	0	1	
CHRYSLER	82				0	0	0	0	0	
TOTAL	175				2	0	0	0	1	
						5 & 6	5 & 7	5 & 8	5 & 9	
GM	51					0	0	0	0	
FORD	42					0	0	0	1	
CHRYSLER	82					0	0	0	0	
TOTAL	175					0	0	0	1	
							6 & 7	6 & 8	6 & 9	
GM	51						0	0	0	
FORD	42						0	0	0	
CHRYSLER	82						0	0	0	
TOTAL	175						0	0	0	
								7 & 8	7 & 9	
GM	51							0	0	
FORD	42							0	0	
CHRYSLER	82							0	0	
TOTAL	175							0	0	
									8 & 9	
GM	51								0	
FORD	42								0	
CHRYSLER	82								1	
TOTAL	175								1	

*SYSTEM CODE:
1 - INDUCTION SYSTEM
2 - CARBURETOR/FUEL
3 - IGNITION
4 - EXHAUST GAS RECIRCULATION
5 - AIR PUMP
6 - PCV
7 - EXHAUST
8 - EVAPORATION
9 - ENGINE ASSEMBLY

TABLE A-61 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE INDUCTION SYSTEM BY CITY

CITY	# CARS	INDUCTION SUBSYSTEM													
		HEATED AIR INLET DOOR		HEATED AIR INLET DIAPHRAGM		TEMPERATURE SENSORS		DELAY VALVE (FORD)		AIR FILTER ELEMENT		HOSES, TUBES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	33	1	100.0	1	100.0	1	100.0	1	3.0	1	100.0	1	90.9	3	100.0
		3	0.0	3	0.0	3	0.0	3	97.0			5	9.1		
				6	0.0	5	0.0								
						6	0.0								
DETROIT	42	1	100.0	1	97.6	1	95.2	1	0.0	1	100.0	1	97.6	3	100.0
		3	0.0	3	0.0	3	0.0	3	100.0			5	2.4		
				6	2.4	5	2.4								
						6	2.4								
WASHINGTON	27	1	96.3	1	96.3	1	96.3	1	0.0	1	100.0	1	100.0	3	100.0
		3	3.7	3	3.7	3	3.7	3	100.0			5	0.0		
				6	0.0	5	0.0								
						6	0.0								
TOTAL	102	1	99.0	1	98.0	1	97.0	1	1.0	1	100.0	1	96.1	3	100.0
		3	1.0	3	1.0	3	1.0	3	99.0			5	3.9		
				6	1.0	5	1.0								
						6	1.0								

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-62 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE INDUCTION SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	INDUCTION SUBSYSTEM													
		HEATED AIR INLET DOOR		HEATED AIR INLET DIAPHRAGM		TEMPERATURE SENSORS		DELAY VALVE (FORD)		AIR FILTER ELEMENT		HOSES, TUBES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	43	1 3	97.7 2.3	1 3 6	97.7 2.3 0.0	1 3 5 6	97.7 2.3 0.0 0.0	1 3	0.0 100.0	1	100.0	1 5	100.0 0.0	3	100.0
FORD	47	1 3	100.0 0.0	1 3 6	97.9 0.0 2.1	1 3 5 6	97.9 0.0 2.1 0.0	1 3	2.1 97.9	1	100.0	1 5	93.6 6.4	3	100.0
CHRYSLER	12	1 3	100.0 0.0	1 3 6	100.0 0.0 0.0	1 3 5 6	91.7 0.0 0.0 8.3	1 3	0.0 100.0	1	100.0	1 5	91.7 8.3	3	100.0
TOTAL	102	1 3	99.0 1.0	1 3 6	98.0 1.0 1.0	1 3 5 6	97.0 1.0 1.0 1.0	1 3	1.0 99.0	1	100.0	1 5	96.1 3.9	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-63 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY CITY

CITY	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CARBURETOR ASSEMBLY		LIMITER CAPS		IDLE MIXTURE ADJUST		IDLE SPEED		EXTERNAL IDLE ENRICH		IDLE STOP ASSEMBLY		DASHPOT AND THROTTLE		FUEL FILTER		HOSES, LINES, WIRES FOR FUEL		OTHER FUEL	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	33	1	100.0	1 5	78.8 21.2	1 4	87.9 12.1	1 4	90.9 9.1	1 3	6.1 93.9	1 3	9.1 90.9	3	100.0	1	100.0	1	100.0	3	100.0
DETROIT	42	1	100.0	1 5	92.9 7.1	1 4	90.5 9.5	1 4	76.2 23.8	1 3	4.8 95.2	1 3	9.5 90.5	3	100.0	1	100.0	1	100.0	3	100.0
WASHINGTON	27	1	100.0	1 5	70.4 29.6	1 4	96.3 3.7	1 4	85.2 14.8	1 3	11.1 88.9	1 3	25.9 74.1	3	100.0	1	100.0	1	100.0	3	100.0
TOTAL	102	1	100.0	1 5	82.4 17.6	1 4	91.2 8.8	1 4	83.3 16.7	1 3	6.9 93.1	1 3	13.7 86.3	3	100.0	1	100.0	1	100.0	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-63 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY CITY (cont.)

CITY	# CARS	CARBURETOR/FUEL SUBSYSTEM																	
		CHOKE ADJUST		VACUUM DIAPHRAGM		ELECTRICAL CONTROLS		CHOKE, LINES, WIRES		EXHAUST HEAT CONTROL		ACTUATING DIAPHRAGM		COOLANT TEMPERATURE SWITCHES		CHECK VALVE		HOSES, LINES, WIRES FOR CHOKE		OTHER CHOKE	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	33	1 3 4	84.8 0.0 15.2	1 3 6	75.8 24.2 0.0	1 3	69.7 30.3	1 3	100.0 0.0	1 3	27.3 72.7	1 3 6	18.2 78.8 3.0	1 3	21.2 78.8	1 3	3.0 97.0	1 3	30.3 69.7	3	100.0
DETROIT	42	1 3 4	92.9 0.0 7.1	1 3 6	76.2 21.4 2.4	1 3	69.0 31.0	1 3	100.0 0.0	1 3	28.6 71.4	1 3 6	21.4 78.6 0.0	1 3	21.4 78.6	1 3	0.0 100.0	1 3	42.9 57.1	3	100.0
WASHINGTON	27	1 3 4	92.6 3.7 3.7	1 3 4	96.3 3.7 0.0	1 3	44.4 55.6	1 3	96.3 3.7	1 3	40.7 59.3	1 3 6	37.0 63.0 0.0	1 3	29.6 70.4	1 3	3.7 96.3	1 3	51.8 48.2	3	100.0
TOTAL	102	1 3 4	90.2 1.0 8.8	1 3 6	81.4 17.6 1.0	1 3	62.8 37.2	1 3	99.0 1.0	1 3	31.4 68.6	1 3 6	24.5 74.5 1.0	1 3	23.5 76.5	1 3	2.0 98.0	1 3	41.2 58.8	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-64 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	CARBURETOR/FUEL SUBSYSTEM																	
		CARBURETOR ASSEMBLY		LIMITER CAPS		IDLE MIXTURE ADJUST		IDLE SPEED		EXTERNAL IDLE ENRICH		IDLE STOP ASSEMBLY		DASHPOT AND THROTTLE		FUEL FILTER		HOSES, LINES, WIRES FOR FUEL		OTHER FUEL	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	43	1	100.0	1 5	97.7 2.3	1 4	97.7 2.3	1 4	90.7 9.3	1 3	0.0 100.0	1 3	11.6 88.4	3	100.0	1	100.0	1	100.0	3	100.0
FORD	47	1	100.0	1 5	78.7 21.3	1 4	87.2 12.8	1 4	80.8 19.2	1 3	0.0 100.0	1 3	17.0 83.0	3	100.0	1	100.0	1	100.0	3	100.0
CHRYSLER	12	1	100.0	1 5	41.7 58.3	1 4	83.3 16.7	1 3	66.7 33.3	1 3	58.3 41.7	1 3	8.3 91.7	3	100.0	1	100.0	1	100.0	3	100.0
TOTAL	102	1	100.0	1 5	82.4 17.6	1 4	91.2 8.8	1 4	83.3 16.7	1 3	6.9 93.1	1 3	13.7 86.3	3	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-64 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY MANUFACTURER (cont.)

MANUFACTURER	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CHOKE ADJUST		VACUUM DIAPHRAGM		ELECTRICAL CONTROLS		CHOKE, LINES, WIRES		EXHAUST HEAT CONTROL		ACTUATING DIAPHRAGM		COOLANT TEMPERATURE SWITCHES		CHECK VALVE		HOSES, LINES, WIRES FOR CHOKE		OTHER CHOKE	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	43	1 3 4	93.0 2.3 4.7	1 3 6	97.7 2.3 0.0	1 3	14.0 86.0	1 3	97.7 2.3	1 3	58.1 41.9	1 3 6	55.8 41.9 2.3	1 3	53.5 46.5	1 3	4.6 95.4	1 3	72.1 27.9	3	100.0
FORD	47	1 3 4	89.4 0.0 10.6	1 3 6	66.0 34.0 0.0	1 3	97.9 2.1	1 3	100.0 0.0	1 3	2.1 97.9	1 3 6	2.1 97.9 0.0	1 3	2.1 97.9	1 3	0.0 100.0	1 3	10.6 89.4	3	100.0
CHRYSLER	12	1 3 4	83.3 0.0 16.7	1 3 6	83.4 8.3 8.3	1 3	100.0 0.0	1 3	100.0 0.0	1 3	50.0 50.0	1 3 6	0.0 100.0 0.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	50.0 50.0	3	100.0
TOTAL	102	1 3 4	90.2 1.0 8.8	1 3 6	81.4 17.6 1.0	1 3	62.8 37.2	1 3	99.0 1.0	1 3	31.4 68.6	1 3 6	24.5 74.5 1.0	1 3	23.5 76.5	1 3	2.0 98.0	1 3	41.2 58.8	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-65 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE IGNITION SYSTEM BY CITY

CITY	# CARS	IGNITION SUBSYSTEM															
		DISTRIBUTOR		INITIAL TIMING		SPARK PLUGS/ WIRES		VACUUM ADVANCE		SPARK DELAY DEVICES		COOLANT TEMPERATURE SWITCHES		OTHER HOSES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	33	1	100.0	1 4	93.9 6.1	1	100.0	1 3	100.0 0.0	1 3	6.1 93.9	1 3 6	6.1 93.9 0.0	1 5	100.0 0.0	3	100.0
DETROIT	42	1	100.0	1 4	85.7 14.3	1	100.0	1 3	97.6 2.4	1 3	4.8 95.2	1 3 6	14.3 83.3 2.4	1 5	97.6 2.4	3	100.0
WASHINGTON	27	1	100.0	1 4	96.3 3.7	1	100.0	1 3	100.0 0.0	1 3	18.5 81.5	1 3 6	25.9 74.1 0.0	1 5	100.0 0.0	3	100.0
TOTAL	102	1	100.0	1 4	91.2 8.8	1	100.0	1 3	99.0 1.0	1 3	8.8 91.2	1 3 6	14.7 84.3 1.0	1 5	99.0 1.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-66 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE IGNITION SYSTEM BY MANUFACTURER

MANUFAC-TURER	# CARS	IGNITION SUBSYSTEM															
		DISTRIBUTOR		INITIAL TIMING		SPARK PLUGS/ WIRES		VACUUM ADVANCE		SPARK DELAY DEVICES		COOLANT TEMPERATURE SWITCHES		OTHER HOSES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	43	1	100.0	1 4	90.7 9.3	1	100.0	1 3	100.0 0.0	1 3	9.3 90.7	1 3 6	23.3 74.4 2.3	1 5	100.0 0.0	3	100.0
FORD	47	1	100.0	1 4	89.4 10.6	1	100.0	1 3	100.0 0.0	1 3	4.3 95.7	1 3 6	8.5 91.5 0.0	1 5	97.9 2.1	3	100.0
CHRYSLER	12	1	100.0	1 4	100.0 0.0	1	100.0	1 3	91.7 8.3	1 3	25.0 75.0	1 3 6	8.3 91.7 0.0	1 5	100.0 0.0	3	100.0
TOTAL	102	1	100.0	1 4	91.2 8.8	1	100.0	1 3	99.0 1.0	1 3	8.8 91.2	1 3 6	14.7 84.3 1.0	1 5	99.0 1.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-67 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES

WITH EACH TYPE OF PERFORMANCE* FOR THE EGR SYSTEM BY CITY

CITY	# CARS	EGR SUBSYSTEM																	
		EGR VALVE		EGR VALVE TRANSDUCER		EGR TIME DELAY SOLENOID (CHRYSLER)		VENTURI VACUUM AMPLIFIER (CHRYSLER) (FORD)		HIGH-SPEED MODULATOR (FORD)		VACUUM RESERVOIR (FORD)		COOLANT TEMPERATURE VACUUM SWITCHES		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	33	1 3	100.0 0.0	1 3 6	39.4 60.6 0.0	1 3	3.0 97.0	1 3	9.1 90.9	1 3	0.0 100.0	1 3	15.2 84.8	1 3	45.4 54.6	1 3	100.0 0.0	1 3	0.0 100.0
DETROIT	42	1 3	97.6 2.4	1 3 6	21.4 73.8 4.8	1 3	4.8 95.2	1 3	7.1 92.9	1 3	2.4 97.6	1 3	16.7 83.3	1 3	76.2 23.8	1 3	90.5 9.5	1 3	2.4 97.6
WASHINGTON	27	1 3	100.0 0.0	1 3 6	14.8 81.5 3.7	1 3	7.4 92.6	1 3	14.8 85.2	1 3	0.0 100.0	1 3	0.0 100.0	1 3	70.4 29.6	1 3	100.0 0.0	1 3	0.0 100.0
TOTAL	102	1 3	99.0 1.0	1 3 6	25.5 71.6 2.9	1 3	4.9 95.1	1 3	9.8 90.2	1 3	1.0 99.0	1 3	11.8 88.2	1 3	64.7 35.3	1 3	96.1 3.9	1 3	1.0 99.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-68 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EGR SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	EGR SUBSYSTEM																	
		EGR VALVE		EGR VALVE TRANSDUCER		EGR TIME DELAY SOLENOID (CHRYSLER)		VENTURI VACUUM AMPLIFIER (CHRYSLER) (FORD)		HIGH-SPEED MODULATOR (FORD)		VACUUM RESERVOIR (FORD)		COOLANT TEMPERATURE VACUUM SWITCHES		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	43	1 3	100.0 0.0	1 3 6	9.3 88.4 2.3	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	76.7 23.3	1 3	97.7 2.3	1 3	0.0 100.0
FORD	47	1 3	100.0 0.0	1 3 6	46.8 48.9 4.3	1 3	0.0 100.0	1 3	4.3 95.7	1 3	2.1 97.9	1 3	25.5 74.5	1 3	46.8 53.2	1 3	95.7 4.3	1 3	2.1 97.9
CHRYSLER	12	1 3	91.7 8.3	1 3 6	0.0 100.0 0.0	1 3	41.7 58.3	1 3	66.7 33.3	1 3	0.0 100.0	1 3	0.0 100.0	1 3	91.7 8.3	1 3	91.7 8.3	1 3	0.0 100.0
TOTAL	102	1 3	99.0 1.0	1 3 6	25.5 71.6 2.9	1 3	4.9 95.1	1 3	9.8 90.2	1 3	1.0 99.0	1 3	11.8 88.2	1 3	64.7 35.3	1 3	96.1 3.9	1 3	1.0 99.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-69 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE AIR PUMP SYSTEM BY CITY

CITY	# CARS	AIR PUMP SUBSYSTEM																			
		AIR PUMP		BYPASS VALVE, PUMP VALVE		CHECK VALVE		ELECTRIC PVS		SOLENOID VACUUM VALVE		FLOOR PAN SWITCH (FORD)		VACUUM DIFF CONTROL		DRIVE BELT ATTACHING HOWE		HOSES, LINES, WIRES		OTHER AIR PUMP	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	33	1 3	54.6 45.4	1 3	54.6 45.4	1 3	54.6 45.4	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	6.1 93.9	1 3	54.6 45.4	1 3	57.6 42.4	3	100.0
DETROIT	42	1 3	50.0 50.0	1 3	50.0 50.0	1 3	50.0 50.0	1 3	7.1 92.9	1 3	7.1 92.9	1 3	4.8 95.2	1 3	42.9 57.1	1 3	50.0 50.0	1 3	50.0 50.0	3	100.0
WASHINGTON	27	1 3	33.3 66.7	1 3	33.3 66.7	1 3	33.3 66.7	1 3	3.7 96.3	1 3	14.8 85.2	1 3	3.7 96.3	1 3	14.8 85.2	1 3	33.3 66.7	1 3	33.3 66.7	3	100.0
TOTAL	102	1 3	47.1 52.9	1 3	47.1 52.9	1 3	47.1 52.9	1 3	3.9 96.1	1 3	6.9 93.1	1 3	2.9 97.1	1 3	23.5 76.5	1 3	47.1 52.9	1 3	48.0 52.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-70 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES

WITH EACH TYPE OF PERFORMANCE* FOR THE AIR PUMP SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	AIR PUMP SUBSYSTEM																			
		AIR PUMP		BYPASS VALVE, PUMP VALVE		CHECK VALVE		ELECTRIC PVS		SOLENOID VACUUM VALVE		FLOOR PAN SWITCH (FORD)		VACUUM DIFF CONTROL		DRIVE BELT ATTACHING HOWE		HOSES, LINES WIRES		OTHER AIR PUMP	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	43	1 3	2.3 97.7	1 3	2.3 97.7	1 3	2.3 97.7	1 3	2.3 97.7	1 3	2.3 97.7	1 3	0.0 100.0	1 3	2.3 97.7	1 3	2.3 97.7	1 3	4.6 95.4	3	100.0
FORD	47	1 3	100.0 0.0	1 3	100.0 0.0	1 3	100.0 0.0	1 3	6.4 93.6	1 3	12.8 87.2	1 3	6.4 93.6	1 3	48.9 51.1	1 3	100.0 0.0	1 3	100.0 0.0	3	100.0
CHRYSLER	12	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	3	100.0
TOTAL	102	1 3	47.1 52.9	1 3	47.1 52.9	1 3	47.1 52.9	1 3	3.9 96.1	1 3	6.9 93.1	1 3	2.9 97.1	1 3	23.5 76.5	1 3	47.1 52.9	1 3	48.0 52.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-71 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE PCV SYSTEM BY CITY

CITY	# CARS	PCV SUBSYSTEM							
		PCV VALVE		FILTERS		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	33	1 3	97.0 3.0	1 3	97.0 3.0	1 3 5	97.0 3.0 0.0	3	100.0
DETROIT	42	1 3	100.0 0.0	1 3	100.0 0.0	1 3 5	97.6 0.0 2.4	3	100.0
WASHINGTON	27	1 3	100.0 0.0	1 3	100.0 0.0	1 3 5	100.0 0.0 0.0	3	100.0
TOTAL	102	1 3	99.0 1.0	1 3	99.0 1.0	1 3 5	98.0 1.0 1.0	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-72 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE PCV SYSTEM BY MANUFACTURER

MANUFAC-TURER	# CARS	PCV SUBSYSTEM							
		PCV VALVE		FILTERS		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	43	1	97.7	1	97.7	1	97.7	3	100.0
		3	2.3	3	2.3	3	2.3		
						5	0.0		
FORD	47	1	100.0	1	100.0	1	97.9	3	100.0
		3	0.0	3	0.0	3	0.0		
						5	2.1		
CHRYSLER	12	1	100.0	1	100.0	1	100.0	3	100.0
		3	0.0	3	0.0	3	0.0		
						5	0.0		
TOTAL	102	1	99.0	1	99.0	1	98.0	3	100.0
		3	1.0	3	1.0	3	1.0		
						5	1.0		

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-73 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EXHAUST SYSTEM BY CITY

CITY	# CARS	EXHAUST SUBSYSTEM					
		EXHAUST MANIFOLD, MUFFLER		CATALYST		OTHER	
		CODE	%	CODE	%	CODE	%
CHICAGO	33	1	100.0	1	100.0	3	100.0
DETROIT	42	1	100.0	1	100.0	3	100.0
WASHINGTON	27	1	100.0	1	100.0	3	100.0
TOTAL	102	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-74 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EXHAUST SYSTEM BY MANUFACTURER

MANUFAC-TURER	# CARS	EXHAUST SUBSYSTEM					
		EXHAUST MANIFOLD, MUFFLER		CATALYST		OTHER	
		CODE	%	CODE	%	CODE	%
GENERAL MOTORS	43	1	100.0	1	100.0	3	100.0
FORD	47	1	100.0	1	100.0	3	100.0
CHRYSLER	12	1	100.0	1	100.0	3	100.0
TOTAL	102	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-75 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EVAPORATIVE SYSTEM BY CITY

CITY	# CARS	EVAPORATION SUBSYSTEM							
		EVAPORATION CANISTER		CANISTER FILTER		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	33	1	100.0	1	100.0	3	100.0	3	100.0
DETROIT	42	1	100.0	1	100.0	3	100.0	3	100.0
WASHINGTON	27	1	100.0	1	100.0	3	100.0	3	100.0
TOTAL	102	1	100.0	1	100.0	3	100.0	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-76 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EVAPORATIVE SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	EVAPORATION SUBSYSTEM							
		EVAPORATION CANISTER		CANISTER FILTER		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	43	1	100.0	1	100.0	1	100.0	3	100.0
FORD	47	1	100.0	1	100.0	1	100.0	3	100.0
CHRYSLER	12	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	102	1	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-77 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE ENGINE ASSEMBLY SYSTEM BY CITY

CITY	# CARS	ENGINE ASSEMBLY SUBSYSTEM															
		ENGINE ASSEMBLY		ENGINE OIL & FILTER		COOLING SYSTEM		MECHANICAL VALVE ADJUST		CARBURETOR & INTAKE BOLTS		BELT TENSIONS		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	33	1	100.0	1	100.0	1	100.0	1 2	15.2 84.8	1	100.0	1	100.0	1	100.0	3	100.0
DETROIT	42	1	100.0	1	100.0	1	100.0	1 3	19.0 81.0	1	100.0	1	100.0	1	100.0	3	100.0
WASHINGTON	27	1	100.0	1	100.0	1	100.0	1 3	18.5 81.5	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	102	1	100.0	1	100.0	1	100.0	1 3	17.6 82.4	1	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-78 PERCENT OF VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE ENGINE ASSEMBLY SYSTEM BY MANUFACTURER

MANUFAC-TURER	# CARS	ENGINE ASSEMBLY SUBSYSTEM															
		ENGINE ASSEMBLY		ENGINE OIL & FILTER		COOLING SYSTEM		MECHANICAL VALVE ADJUST		CARBURETOR & INTAKE BOLTS		BELT TENSIONS		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	43	1	100.0	1	100.0	1	100.0	1 3	11.6 88.4	1	100.0	1	100.0	1	100.0	3	100.0
FORD	47	1	100.0	1	100.0	1	100.0	1 3	17.0 83.0	1	100.0	1	100.0	1	100.0	3	100.0
CHRYSLER	12	1	100.0	1	100.0	1	100.0	1 3	41.7 58.3	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	102	1	100.0	1	100.0	1	100.0	1 3	17.6 82.4	1	100.0	1	100.0	1	100.0	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-79 FREQUENCY OF MALPERFORMANCE FOR VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES FOR ALL COMBINATIONS OF EMISSIONS SYSTEMS TWO AT A TIME BY CITY

CITY	# CARS	SYSTEM CODE*								
		1 & 2	1 & 3	1 & 4	1 & 5	1 & 6	1 & 7	1 & 8	1 & 9	—
CHICAGO	33	3	0	0	0	0	0	0	0	
DETROIT	42	2	0	0	0	0	0	0	0	
WASHINGTON	27	0	0	0	0	0	0	0	0	
TOTAL	102	5	0	0	0	0	0	0	0	
			2 & 3	2 & 4	2 & 5	2 & 6	2 & 7	2 & 8	2 & 9	
CHICAGO	33		2	0	0	0	0	0	0	
DETROIT	42		5	0	0	1	0	0	0	
WASHINGTON	27		1	0	0	0	0	0	0	
TOTAL	102		8	0	0	1	0	0	0	
				3 & 4	3 & 5	3 & 6	3 & 7	3 & 8	3 & 9	
CHICAGO	33			0	0	0	0	0	0	
DETROIT	42			0	0	0	0	0	0	
WASHINGTON	27			0	0	0	0	0	0	
TOTAL	102			0	0	0	0	0	0	
					4 & 5	4 & 6	4 & 7	4 & 8	4 & 9	
CHICAGO	33				0	0	0	0	0	
DETROIT	42				0	0	0	0	0	
WASHINGTON	27				0	0	0	0	0	
TOTAL	102				0	0	0	0	0	
						5 & 6	5 & 7	5 & 8	5 & 9	
CHICAGO	33					0	0	0	0	
DETROIT	42					0	0	0	0	
WASHINGTON	27					0	0	0	0	
TOTAL	102					0	0	0	0	
							6 & 7	6 & 8	6 & 9	
CHICAGO	33						0	0	0	
DETROIT	42						0	0	0	
WASHINGTON	27						0	0	0	
TOTAL	102						0	0	0	
								7 & 8	7 & 9	
CHICAGO	33							0	0	
DETROIT	42							0	0	
WASHINGTON	27							0	0	
TOTAL	102							0	0	
									8 & 9	
CHICAGO	33								0	
DETROIT	42								0	
WASHINGTON	27								0	
TOTAL	102								0	

*SYSTEM CODE:
1 - INDUCTION SYSTEM
2 - CARBURETOR/FUEL
3 - IGNITION
4 - EXHAUST GAS RECIRCULATION
5 - AIR PUMP
6 - PCV
7 - EXHAUST
8 - EVAPORATION
9 - ENGINE ASSEMBLY

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TABLE A-80 FREQUENCY OF MALPERFORMANCE FOR VEHICLES PROJECTED TO PASS THE INITIAL TEST AT 50,000 MILES FOR ALL COMBINATIONS OF EMISSIONS SYSTEMS TWO AT A TIME BY MANUFACTURER

MANUFAC-TURER	# CARS	SYSTEM CODE*								
		1 & 2	1 & 3	1 & 4	1 & 5	1 & 6	1 & 7	1 & 8	1 & 9	--
GM	43	0	0	0	0	0	0	0	0	
FORD	47	3	0	0	0	0	0	0	0	
CHRYSLER	12	2	0	0	0	0	0	0	0	
TOTAL	102	5	0	0	0	0	0	0	0	
			2 & 3	2 & 4	2 & 5	2 & 6	2 & 7	2 & 8	2 & 9	
GM	43		2	0	0	0	0	0	0	
FORD	47		6	0	0	1	0	0	0	
CHRYSLER	12		0	0	0	0	0	0	0	
TOTAL	102		8	0	0	1	0	0	0	
				3 & 4	3 & 5	3 & 6	3 & 7	3 & 8	3 & 9	
GM	43			0	0	0	0	0	0	
FORD	47			0	0	0	0	0	0	
CHRYSLER	12			0	0	0	0	0	0	
TOTAL	102			0	0	0	0	0	0	
					4 & 5	4 & 6	4 & 7	4 & 8	4 & 9	
GM	43				0	0	0	0	0	
FORD	47				0	0	0	0	0	
CHRYSLER	12				0	0	0	0	0	
TOTAL	102				0	0	0	0	0	
						5 & 6	5 & 7	5 & 8	5 & 9	
GM	43					0	0	0	0	
FORD	47					0	0	0	0	
CHRYSLER	12					0	0	0	0	
TOTAL	102					0	0	0	0	
							6 & 7	6 & 8	6 & 9	
GM	43						0	0	0	
FORD	47						0	0	0	
CHRYSLER	12						0	0	0	
TOTAL	102						0	0	0	
								7 & 8	7 & 9	
GM	43							0	0	
FORD	47							0	0	
CHRYSLER	12							0	0	
TOTAL	102							0	0	
									8 & 9	
GM										
FORD										
CHRYSLER										
TOTAL										

*SYSTEM CODE:
1 - INDUCTION SYSTEM
2 - CARBURETOR/FUEL
3 - IGNITION
4 - EXHAUST GAS RECIRCULATION
5 - AIR PUMP
6 - PCV
7 - EXHAUST
8 - EVAPORATION
9 - ENGINE ASSEMBLY

TABLE A-81 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE INDUCTION SYSTEM BY CITY

CITY	# CARS	INDUCTION SUBSYSTEM													
		HEATED AIR INLET DOOR		HEATED AIR INLET DIAPHRAGM		TEMPERATURE SENSORS		DELAY VALVE (FORD)		AIR FILTER ELEMENT		HOSES, TUBES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	67	1 6	100.0 0.0	1 6	98.5 1.5	0 1 6	0.0 98.5 1.5	3	100.0	1	100.0	1 5	95.5 4.5	3 5	100.0 0.0
DETROIT	58	1 6	98.3 1.7	1 6	100.0 0.0	0 1 6	0.0 100.0 0.0	3	100.0	1	100.0	1 5	96.6 3.4	3 5	100.0 0.0
WASHINGTON	73	1 6	100.0 0.0	1 6	100.0 0.0	0 1 6	1.4 98.6 0.0	3	100.0	1	100.0	1 5	95.9 4.1	3 5	98.6 1.4
TOTAL	198	1 6	99.5 0.5	1 6	99.5 0.5	0 1 6	0.5 99.0 0.5	3	100.0	1	100.0	1 5	96.0 4.0	3 5	99.5 0.5

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-82 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE INDUCTION SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	INDUCTION SUBSYSTEM													
		HEATED AIR INLET DOOR		HEATED AIR INLET DIAPHRAGM		TEMPERATURE SENSORS		DELAY VALVE (FORD)		AIR FILTER ELEMENT		HOSES, TUBES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	59	1 6	98.3 1.7	1 6	100.0 0.0	0 1 6	0.0 100.0 0.0	3	100.0	1	100.0	1 5	98.3 1.7	3 5	100.0 0.0
FORD	52	1 6	100.0 0.0	1 6	98.1 1.9	0 1 6	0.0 100.0 0.0	3	100.0	1	100.0	1 5	94.2 5.8	3 5	100.0 0.0
CHRYSLER	87	1 6	100.0 0.0	1 6	100.0 0.0	0 1 6	1.2 97.7 1.1	3	100.0	1	100.0	1 5	95.4 4.6	3 5	98.8 1.2
TOTAL	198	1 6	99.5 0.5	1 6	99.5 0.5	0 1 6	0.5 99.0 0.5	3	100.0	1	100.0	1 5	96.0 4.0	3 5	99.5 0.5

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-83 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY CITY

CITY	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CARBURETOR ASSEMBLY		LIMITER CAPS		IDLE MIXTURE ADJUST		IDLE SPEED		EXTERNAL IDLE ENRICH		IDLE STOP ASSEMBLY		DASHPOT AND THROTTLE		FUEL FILTER		HOSES, LINES, WIRES FOR FUEL		OTHER FUEL	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	67	1 5 6	97.0 1.5 1.5	1 5	40.3 59.7	1 4	46.3 53.7	1 4	86.6 13.4	1 3 5 6	25.4 73.1 0.0 1.5	1 3	7.5 92.5	1 3 6	1.5 98.5 0.0	1 3	98.5 1.5	1 5	98.5 1.5	3	100.0
DETROIT	58	1 5 6	100.0 0.0 0.0	1 5	48.3 51.7	1 4	43.1 56.9	1 4	56.9 43.1	1 3 5 6	25.9 74.1 0.0 0.0	1 3	12.1 87.9	1 3 6	0.0 100.0 0.0	1 3	100.0 0.0	1 5	98.3 1.7	3	100.0
WASHINGTON	73	1 5 6	97.2 1.4 1.4	1 5	34.2 65.8	1 4	52.0 48.0	1 4	68.5 31.5	1 3 5 6	21.9 75.3 1.4 1.4	1 3	13.7 86.3	1 3 6	0.0 98.6 1.4	1 3	100.0 0.0	1 5	100.0 0.0	3	100.0
TOTAL	198	1 5 6	98.0 1.0 1.0	1 5	40.4 59.6	1 4	47.5 52.5	1 4	71.2 28.8	1 3 5 6	24.4 74.2 0.5 1.0	1 3	11.1 88.9	1 3 6	0.5 99.0 0.5	1 3	99.5 0.5	1 5	99.0 1.0	3	100.0

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8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-83 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY CITY (cont.)

CITY	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CHOKE ADJUST		VACUUM DIAPHRAGM		ELECTRICAL CONTROLS		CHOKE, LINES, WIRES		EXHAUST HEAT CONTROL		ACTUATING DIAPHRAGM		COOLANT TEMPERATURE SWITCHES		CHECK VALVE		HOSES, LINES, WIRES FOR CHOKE		OTHER CHOKE	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	67	1 4	94.0 6.0	1 3 6	94.0 4.5 1.5	1 3 5 6	65.7 32.8 0.0 1.5	1 5 6	97.0 1.5 1.5	1 3	29.8 70.2	1 3	20.9 79.1	1 3 6	19.4 79.1 1.5	1 3	4.5 95.5	1 3 5	34.3 64.2 1.5	3	100.0
DETROIT	58	1 4	77.6 22.4	1 3 6	94.8 0.0 5.2	1 3 5 6	65.5 31.1 1.7 1.7	1 5 6	96.6 3.4 0.0	1 3	36.2 63.8	1 3	17.2 82.8	1 3 6	17.2 82.8 0.0	1 3	5.2 94.8	1 3 5	43.1 56.9 0.0	3	100.0
WASHINGTON	73	1 4	94.5 5.5	1 3 6	97.2 1.4 1.4	1 3 5 6	71.2 24.7 0.0 4.1	1 5 6	98.6 1.4 0.0	1 3	30.1 69.9	1 3	19.2 80.8	1 3 6	17.8 82.2 0.0	1 3	1.4 98.6	1 3 5	37.0 63.0 0.0	3	100.0
TOTAL	198	1 4	89.4 10.6	1 3 6	95.5 2.0 2.5	1 3 5 6	67.7 29.3 0.5 2.5	1 5 6	97.5 2.0 0.5	1 3	31.8 68.2	1 3	19.2 80.8	1 3 6	18.2 81.3 0.5	1 3	3.5 96.5	1 3 5	37.9 61.6 0.5	3	100.0

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3 - NOT APPLICABLE
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5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-84 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	CARBURETOR/FUEL SUBSYSTEM																			
		CARBURETOR ASSEMBLY		LIMITER CAPS		IDLE MIXTURE ADJUST		IDLE SPEED		EXTERNAL IDLE ENRICH		IDLE STOP ASSEMBLY		DASHPOT AND THROTTLE		FUEL FILTER		HOSES, LINES, WIRES FOR FUEL		OTHER FUEL	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	59	1 5 6	100.0 0.0 0.0	1 5	49.2 50.8	1 4	54.2 45.8	1 4	74.6 25.4	1 3 5 6	0.0 100.0 0.0 0.0	1 3	8.5 91.5	1 3 6	1.7 98.3 0.0	1 3	100.0 0.0	1 5	100.0 0.0	3	100.0
FORD	52	1 5 6	98.1 1.9 0.0	1 5	50.0 50.0	1 4	82.7 17.3	1 4	71.2 28.8	1 3 5 6	0.0 100.0 0.0 0.0	1 3	21.2 78.8	1 3 6	0.0 100.0 0.0	1 3	98.1 1.9	1 5	100.0 0.0	3	100.0
CHRYSLER	87	1 5 6	96.6 1.1 2.3	1 5	28.7 71.3	1 4	21.8 78.2	1 4	69.0 31.0	1 3 5 6	55.2 41.4 1.1 2.3	1 3	6.9 93.1	1 3 6	0.0 98.8 1.2	1 3	100.0 0.0	1 5	97.7 2.3	3	100.0
TOTAL	198	1 5 6	98.0 1.0 1.0	1 5	40.4 59.6	1 4	47.5 52.5	1 4	71.2 28.8	1 3 5 6	24.3 74.2 0.5 1.0	1 3	11.1 88.9	1 3 6	0.5 99.0 0.5	1 3	99.5 0.5	1 5	99.0 1.0	3	100.0

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4 - MALADJUSTED
5 - DISABLED
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8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-84 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE CARBURETOR/FUEL SYSTEM BY MANUFACTURER (cont.)

MANUFACTURER	# CARS			CARBURETOR/FUEL SUBSYSTEM																	
		CHOKE ADJUST		VACUUM DIAPHRAGM		ELECTRICAL CONTROLS		CHOKE, LINES, WIRES		EXHAUST HEAT CONTROL		ACTUATING DIAPHRAGM		COOLANT TEMPERATURE SWITCHES		CHECK VALVE		HOSES, LINES, WIRES FOR CHOKE		OTHER CHOKE	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	59	1 4	81.4 18.6	1 3 6	98.3 0.0 1.7	1 3 5 6	3.4 94.9 0.0 1.7	1 5 6	94.9 3.4 1.7	1 3	54.2 45.8	1 3	54.2 45.8	1 3 6	50.8 47.5 1.7	1 3	11.9 88.1	1 3 5	61.0 37.3 1.7	3	100.0
FORD	52	1 4	98.1 1.9	1 3 6	90.4 5.8 3.8	1 3 5 6	96.2 3.8 0.0 0.0	1 5 6	100.0 0.0 0.0	1 3	11.5 88.5	1 3	11.5 88.5	1 3 6	11.5 88.5 0.0	1 3	0.0 100.0	1 3 5	25.0 75.0 0.0	3	100.0
CHRYSLER	87	1 4	89.7 10.3	1 3 6	96.6 1.1 2.3	1 3 5 6	94.2 0.0 1.2 4.6	1 5 6	97.7 2.3 0.0	1 3	28.7 71.3	1 3	0.0 100.0	1 3 6	0.0 100.0 0.0	1 3	0.0 100.0	1 3 5	29.9 70.1 0.0	3	100.0
TOTAL	198	1 4	89.4 10.6	1 3 6	95.5 2.0 2.5	1 3 5 6	67.7 29.3 0.5 2.5	1 5 6	97.5 2.0 0.5	1 3	31.8 68.2	1 3	19.2 80.8	1 3 6	18.2 81.3 0.5	1 3	3.5 96.5	1 3 5	37.9 61.6 0.5	3	100.0

*PERFORMANCE CODE:

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1 - NO MALPERFORMANCE
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3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
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8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-85 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE FOR THE IGNITION SYSTEM BY CITY

CITY	# CARS	IGNITION SUBSYSTEM															
		DISTRIBUTOR		INITIAL TIMING		SPARK PLUGS/ WIRES		VACUUM ADVANCE		SPARK DELAY DEVICES		COOLANT TEMPERATURE SWITCHES		OTHER HOSES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	67	1 6 7	98.5 1.5 0.0	1 4	85.1 14.9	1 6 8	100.0 0.0 0.0	1 3 6	94.0 3.0 3.0	1 3 5 6	31.3 67.2 0.0 1.5	1 3	28.4 71.6	1 5	92.5 7.5	3	100.0
DETROIT	58	1 6 7	94.8 3.5 1.7	1 4	77.6 22.4	1 6 8	100.0 0.0 0.0	1 3 6	100.0 0.0 0.0	1 3 5 6	24.2 72.4 1.7 1.7	1 3	25.9 74.1	1 5	98.3 1.7	3	100.0
WASHINGTON	73	1 6 7	98.6 1.4 0.0	1 4	65.8 34.2	1 6 8	93.2 4.1 2.7	1 3 6	100.0 0.0 0.0	1 3 5 6	24.7 74.0 0.0 1.3	1 3	30.1 69.9	1 5	95.9 4.1	3	100.0
TOTAL	198	1 6 7	97.5 2.0 0.5	1 4	75.8 24.2	1 6 8	97.5 1.5 1.0	1 3 6	98.0 1.0 1.0	1 3 5 6	26.8 71.2 0.5 1.5	1 3	28.3 71.7	1 5	95.4 4.6	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-86 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE IGNITION SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	IGNITION SUBSYSTEM															
		DISTRIBUTOR		INITIAL TIMING		SPARK PLUGS/ WIRES		VACUUM ADVANCE		SPARK DELAY DEVICES		COOLANT TEMPERATURE SWITCHES		OTHER HOSES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	59	1 6 7	100.0 0.0 0.0	1 4	74.6 25.4	1 6 8	100.0 0.0 0.0	1 3 6	98.3 1.7 0.0	1 3 5 6	23.7 76.3 0.0 0.0	1 3	37.3 62.7	1 5	96.6 3.4	3	100.0
FORD	52	1 6 7	96.2 1.9 1.9	1 4	71.2 28.8	1 6 8	96.2 3.8 0.0	1 3 6	100.0 0.0 0.0	1 3 5 6	15.4 84.6 0.0 0.0	1 3	26.9 73.1	1 5	98.1 1.9	3	100.0
CHRYSLER	87	1 6 7	96.6 3.4 0.0	1 4	79.3 20.7	1 6 8	96.6 1.1 2.3	1 3 6	96.6 1.1 2.3	1 3 5 6	35.6 59.8 1.2 3.4	1 3	23.0 77.0	1 5	93.1 6.9	3	100.0
TOTAL	198	1 6 7	97.5 2.0 0.5	1 4	75.8 24.2	1 6 8	97.5 1.5 1.0	1 3 6	98.0 1.0 1.0	1 3 5 6	26.8 71.2 0.5 1.5	1 3	28.3 71.7	1 5	95.4 4.6	3	100.0

*PERFORMANCE CODE:

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8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-87 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EGR SYSTEM BY CITY

CITY	# CARS	EGR SUBSYSTEM																	
		EGR VALVE		EGR VALVE TRANSDUCER		EGR TIME DELAY SOLENOID (CHRYSLER)		VENTURI VACUUM AMPLIFIER (CHRYSLER) (FORD)		HIGH-SPEED MODULATOR (FORD)		VACUUM RESERVOIR (FORD)		COOLANT TEMPERATURE VACUUM SWITCHES		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	67	1	88.0	1	11.9	1	11.9	1	29.8	1	0.0	1	3.0	1	83.6	1	89.6	3	100.0
		3	0.0	3	86.6	3	86.6	3	70.2	3	100.0	3	97.0	3	14.9	3	0.0		
		5	9.0	6	1.5	6	1.5							5	0.0	5	10.4		
		6	3.0											6	1.5	6	0.0		
DETROIT	58	1	98.3	1	15.5	1	22.4	1	34.5	1	1.7	1	0.0	1	84.5	1	86.2	3	100.0
		3	1.7	3	77.6	3	77.6	3	65.5	3	98.3	3	100.0	3	15.5	3	1.7		
		5	0.0	6	6.9	6	0.0							5	0.0	5	10.4		
		6	0.0											6	0.0	6	1.7		
WASHINGTON	73	1	97.2	1	15.1	1	16.4	1	42.5	1	0.0	1	4.1	1	83.6	1	87.7	3	100.0
		3	0.0	3	76.7	3	82.2	3	57.5	3	100.0	3	95.9	3	15.0	3	2.7		
		5	1.4	6	8.2	6	1.4							5	1.4	5	9.6		
		6	1.4											6	0.0	6	0.0		
TOTAL	198	1	94.5	1	14.1	1	16.7	1	35.9	1	0.5	1	2.5	1	83.8	1	87.9	3	100.0
		3	0.5	3	80.3	3	82.3	3	64.1	3	99.5	3	97.5	3	15.2	3	1.5		
		5	3.5	6	5.6	6	1.0							5	0.5	5	10.1		
		6	1.5											6	0.5	6	0.5		

*PERFORMANCE CODE:

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3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-88 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EGR SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	EGR SUBSYSTEM																	
		EGR VALVE		EGR VALVE TRANSDUCER		EGR TIME DELAY SOLENOID (CHRYSLER)		VENTURI VACUUM AMPLIFIER (CHRYSLER) (FORD)		HIGH-SPEED MODULATOR (FORD)		VACUUM RESERVOIR (FORD)		COOLANT TEMPERATURE VACUUM SWITCHES		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	59	1	100.0	1	3.4	1	0.0	1	0.0	1	0.0	1	0.0	1	79.7	1	86.4	3	100.0
		3	0.0	3	94.9	3	100.0	3	100.0	3	100.0	3	100.0	3	18.6	3	1.7		
		5	0.0	6	1.7	6	0.0							5	0.0	5	11.9		
		6	0.0											6	1.7	6	0.0		
FORD	52	1	98.1	1	50.0	1	0.0	1	5.8	1	1.9	1	9.6	1	65.4	1	88.5	3	100.0
		3	0.0	3	30.8	3	100.0	3	94.2	3	98.1	3	90.4	3	34.6	3	1.9		
		5	0.0	6	19.2	6	0.0							5	0.0	5	7.7		
		6	1.9											6	0.0	6	1.9		
CHRYSLER	87	1	88.5	1	0.0	1	37.9	1	78.2	1	0.0	1	0.0	1	97.7	1	88.5	3	100.0
		3	1.2	3	100.0	3	59.8	3	21.8	3	100.0	3	100.0	3	1.1	3	1.2		
		5	8.0	6	0.0	6	2.3							5	1.2	5	10.3		
		6	2.3											6	0.0	6	0.0		
TOTAL	198	1	94.4	1	14.1	1	16.7	1	35.9	1	0.5	1	2.5	1	83.8	1	87.9	3	100.0
		3	0.5	3	80.3	3	82.3	3	64.1	3	99.5	3	97.5	3	15.2	3	1.5		
		5	3.6	6	5.6	6	1.0							5	0.5	5	10.1		
		6	1.5											6	0.5	6	0.5		

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-89 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE AIR PUMP SYSTEM BY CITY

CITY	# CARS	AIR PUMP SUBSYSTEM																			
		AIR PUMP		BYPASS VALVE, PUMP VALVE		CHECK VALVE		ELECTRIC PVS		SOLENOID VACUUM VALVE		FLOOR PAN SWITCH (FORD)		VACUUM DIFF CONTROL		DRIVE BELT ATTACHING HOWE		HOSES, LINES, WIRES		OTHER AIR PUMP	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	67	1	23.9	1	23.9	1	23.9	1	1.5	1	3.0	3	100.0	1	4.5	1	23.9	1	23.9	3	100.0
		3	76.1	3	76.1	3	76.1	3	98.5	3	97.0			3	95.5	3	76.1	3	76.1		
																		5	0.0		
DETROIT	58	1	22.4	1	22.4	1	22.4	1	0.0	1	0.0	3	100.0	1	20.7	1	22.4	1	19.0	3	100.0
		3	77.6	3	77.6	3	77.6	3	100.0	3	100.0			3	79.3	3	77.6	3	77.6		
																		5	3.4		
WASHINGTON	73	1	35.6	1	35.6	1	35.6	1	2.7	1	2.7	3	100.0	1	0.0	1	35.6	1	35.6	3	100.0
		3	64.4	3	64.4	3	64.4	3	97.3	3	97.3			3	100.0	3	64.4	3	64.4		
																		5	0.0		
TOTAL	198	1	27.8	1	27.8	1	27.8	1	1.5	1	2.0	3	100.0	1	7.6	1	27.8	1	26.8	3	100.0
		3	72.2	3	72.2	3	72.2	3	98.5	3	98.0			3	92.4	3	72.2	3	72.2		
																		5	1.0		

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-90 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE AIR PUMP SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	AIR PUMP SUBSYSTEM																			
		AIR PUMP		BYPASS VALVE, PUMP VALVE		CHECK VALVE		ELECTRIC PVS		SOLENOID VACUUM VALVE		FLOOR PAN SWITCH (FORD)		VACUUM DIFF CONTROL		DRIVE BELT ATTACHING HOWE		HOSES, LINES, WIRES		OTHER AIR PUMP	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	59	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3	0.0 100.0	3	100.0	1 3	0.0 100.0	1 3	0.0 100.0	1 3 5	0.0 100.0 0.0	3	100.0
FORD	52	1 3	100.0 0.0	1 3	100.0 0.0	1 3	100.0 0.0	1 3	5.8 94.2	1 3	7.7 92.3	3	100.0	1 3	28.8 71.2	1 3	100.0 0.0	1 3 5	96.2 0.0 3.8	3	100.0
CHRYSLER	87	1 3	3.4 96.6	1 3	3.4 96.6	1 3	3.4 96.6	1 3	0.0 100.0	1 3	0.0 100.0	3	100.0	1 3	0.0 100.0	1 3	3.4 96.6	1 3 5	3.4 96.6 0.0	3	100.0
TOTAL	198	1 3	27.8 72.2	1 3	27.8 72.2	1 3	27.8 72.2	1 3	1.5 98.5	1 3	2.0 98.0	3	100.0	1 3	7.6 92.4	1 3	27.8 72.2	1 3 5	26.8 72.2 1.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-91 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE PCV SYSTEM BY CITY

CITY	# CARS	PCV SUBSYSTEM							
		PCV VALVE		FILTERS		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	67	1	100.0	1	100.0	1 5	98.5 1.5	3	100.0
DETROIT	58	1	100.0	1	100.0	1 5	100.0 0.0	3	100.0
WASHINGTON	73	1	100.0	1	100.0	1 5	100.0 0.0	3	100.0
TOTAL	198	1	100.0	1	100.0	1 5	99.5 0.5	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-92 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE PCV SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	PCV SUBSYSTEM							
		PCV VALVE		FILTERS		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	59	1	100.0	1	100.0	1 5	100.0 0.0	3	100.0
FORD	52	1	100.0	1	100.0	1 5	100.0 0.0	3	100.0
CHRYSLER	87	1	100.0	1	100.0	1 5	98.8 1.2	3	100.0
TOTAL	198	1	100.0	1	100.0	1 5	99.5 0.5	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-93 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EXHAUST SYSTEM BY CITY

CITY	# CARS	EXHAUST SUBSYSTEM					
		EXHAUST MANIFOLD, MUFFLER		CATALYST		OTHER	
		CODE	%	CODE	%	CODE	%
CHICAGO	67	1	100.0	1 3	98.5 1.5	3	100.0
DETROIT	58	1	100.0	1 3	96.6 3.4	3	100.0
WASHINGTON	73	1	100.0	1 3	95.9 4.1	3	100.0
TOTAL	198	1	100.0	1 3	97.0 3.0	3	100.0

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-94 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EXHAUST SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	EXHAUST SUBSYSTEM					
		EXHAUST MANIFOLD, MUFFLER		CATALYST		OTHER	
		CODE	%	CODE	%	CODE	%
GENERAL MOTORS	59	1	100.0	1 3	100.0 0.0	3	100.0
FORD	52	1	100.0	1 3	96.2 3.8	3	100.0
CHRYSLER	87	1	100.0	1 3	95.4 4.6	3	100.0
TOTAL	198	1	100.0	1 3	97.0 3.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-95 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EVAPORATIVE SYSTEM BY CITY

CITY	# CARS	EVAPORATION SUBSYSTEM							
		EVAPORATION CANISTER		CANISTER FILTER		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	67	1	100.0	1	98.5	1	98.5	3	100.0
				6	1.5	5	1.5		
						6	0.0		
DETROIT	58	1	100.0	1	100.0	1	96.6	3	100.0
				6	0.0	5	1.7		
						6	1.7		
WASHINGTON	73	1	100.0	1	100.0	1	100.0	3	100.0
				6	0.0	5	0.0		
						6	0.0		
TOTAL	198	1	100.0	1	99.5	1	98.5	3	100.0
				6	0.5	5	1.0		
						6	0.5		

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART -- MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-96 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE EVAPORATIVE SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	EVAPORATION SUBSYSTEM							
		EVAPORATION CANISTER		CANISTER FILTER		HOSES, LINES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	59	1	100.0	1	100.0	1	98.3	3	100.0
				6	0.0	5	0.0		
						6	1.7		
FORD	52	1	100.0	1	100.0	1	98.1	3	100.0
				6	0.0	5	1.9		
						6	0.0		
CHRYSLER	87	1	100.0	1	98.8	1	98.8	3	100.0
				6	1.2	5	1.2		
						6	0.0		
TOTAL	198	1	100.0	1	99.5	1	98.5	3	100.0
						5	1.0		
						6	0.5		

***PERFORMANCE CODE:**

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-97 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE ENGINE ASSEMBLY SYSTEM BY CITY

CITY	# CARS	ENGINE ASSEMBLY SUBSYSTEM															
		ENGINE ASSEMBLY		ENGINE OIL & FILTER		COOLING SYSTEM		MECHANICAL VALVE ADJUST		CARBURETOR & INTAKE BOLTS		BELT TENSIONS		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
CHICAGO	67	1	100.0	1 7	100.0 0.0	1 6	100.0 0.0	1 3	20.9 79.1	1	100.0	1	100.0	1	100.0	3	100.0
DETROIT	58	1	100.0	1 7	96.6 3.4	1 6	98.3 1.7	1 3	17.2 82.8	1	100.0	1	100.0	1	100.0	3	100.0
WASHINGTON	73	1	100.0	1 7	100.0 0.0	1 6	100.0 0.0	1 3	19.2 80.8	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	198	1	100.0	1 7	99.0 1.0	1 6	99.5 0.5	1 3	19.2 80.8	1	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART – MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-98 PERCENT OF VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES WITH EACH TYPE OF PERFORMANCE* FOR THE ENGINE ASSEMBLY SYSTEM BY MANUFACTURER

MANUFACTURER	# CARS	ENGINE ASSEMBLY SUBSYSTEM															
		ENGINE ASSEMBLY		ENGINE OIL & FILTER		COOLING SYSTEM		MECHANICAL VALVE ADJUST		CARBURETOR & INTAKE BOLTS		BELT TENSIONS		HOSES, LINES, WIRES		OTHER	
		CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
GENERAL MOTORS	59	1	100.0	1 7	100.0 0.0	1 6	100.0 0.0	1 3	1.7 98.3	1	100.0	1	100.0	1	100.0	3	100.0
FORD	52	1	100.0	1 7	96.2 3.8	1 6	100.0 0-0	1 3	5.8 94.2	1	100.0	1	100.0	1	100.0	3	100.0
CHRYSLER	87	1	100.0	1 7	100.0 0.0	1 6	98.8 1.2	1 3	39.1 60.9	1	100.0	1	100.0	1	100.0	3	100.0
TOTAL	198	1	100.0	1 7	99.0 1.0	1 6	99.5 0.5	1 3	19.2 80.8	1	100.0	1	100.0	1	100.0	3	100.0

*PERFORMANCE CODE:

0 - NOT KNOWN IF EQUIPPED
1 - NO MALPERFORMANCE
2 - NOT USED IN THIS PROGRAM
3 - NOT APPLICABLE
4 - MALADJUSTED
5 - DISABLED
6 - DEFECTIVE
7 - INADEQUATE OR IMPROPER MAINTENANCE
8 - IMPROPER PART - MISBUILD
9 - NOT ORIGINAL MANUFACTURERS EQUIPMENT

TABLE A-99 FREQUENCY OF MALPERFORMANCE FOR VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES FOR ALL COMBINATIONS OF EMISSIONS SYSTEMS TWO AT A TIME BY CITY

CITY	# CARS	SYSTEM CODE*								
		1 & 2	1 & 3	1 & 4	1 & 5	1 & 6	1 & 7	1 & 8	1 & 9	--
CHICAGO	67	4	2	0	0	0	0	2	0	
DETROIT	58	3	0	1	0	0	0	0	0	
WASHINGTON	73	3	3	2	0	0	0	0	0	
TOTAL	198	10	5	3	0	0	0	2	0	
			2 & 3	2 & 4	2 & 5	2 & 6	2 & 7	2 & 8	2 & 9	
CHICAGO	67		12	12	0	1	0	1	0	
DETROIT	58		17	7	2	0	0	2	3	
WASHINGTON	73		28	16	0	0	0	0	0	
TOTAL	198		57	35	2	1	0	3	3	
				3 & 4	3 & 5	3 & 6	3 & 7	3 & 8	3 & 9	
CHICAGO	67			5	0	0	0	2	0	
DETROIT	58			3	0	0	0	1	1	
WASHINGTON	73			8	0	0	0	0	0	
TOTAL	198			16	0	0	0	3	1	
					4 & 5	4 & 6	4 & 7	4 & 8	4 & 9	
CHICAGO	67				0	0	0	0	0	
DETROIT	58				2	0	0	0	1	
WASHINGTON	73				0	0	0	0	0	
TOTAL	198				2	0	0	0	1	
						5 & 6	5 & 7	5 & 8	5 & 9	
CHICAGO	67					0	0	0	0	
DETROIT	58					0	0	0	1	
WASHINGTON	73					0	0	0	0	
TOTAL	198					0	0	0	1	
							6 & 7	6 & 8	6 & 9	
CHICAGO	67						0	0	0	
DETROIT	58						0	0	0	
WASHINGTON	73						0	0	0	
TOTAL	198						0	0	0	
								7 & 8	7 & 9	
CHICAGO	67							0	0	
DETROIT	58							0	0	
WASHINGTON	73							0	0	
TOTAL	198							0	0	
									8 & 9	
CHICAGO	67								0	
DETROIT	58								1	
WASHINGTON	73								0	
TOTAL	198								1	

***SYSTEM CODE:**

1 - INDUCTION SYSTEM
2 - CARBURETOR/FUEL
3 - IGNITION
4 - EXHAUST GAS RECIRCULATION
5 - AIR PUMP
6 - PCV
7 - EXHAUST
8 - EVAPORATION
9 - ENGINE ASSEMBLY

TABLE A-100 FREQUENCY OF MALPERFORMANCE FOR VEHICLES PROJECTED TO FAIL THE INITIAL TEST AT 50,000 MILES FOR ALL COMBINATIONS OF EMISSIONS SYSTEMS TWO AT A TIME BY MANUFACTURER

MANUFAC-TURER	# CARS	SYSTEM CODE*								
		1&2	1&3	1&4	1&5	1&6	1&7	1&8	1&9	—
GM	59	1	0	0	0	0	0	0	0	
FORD	52	4	2	2	0	0	0	1	0	
CHRYSLER	87	5	3	1	0	0	0	1	0	
TOTAL	198	10	5	3	0	0	0	2	0	
			2&3	2&4	2&5	2&6	2&7	2&8	2&9	
GM	59		14	5	0	0	0	1	0	
FORD	52		13	11	2	0	0	1	2	
CHRYSLER	87		30	19	0	1	0	1	1	
TOTAL	198		57	35	2	1	0	3	3	
				3&4	3&5	3&6	3&7	3&8	3&9	
GM	59			2	0	0	0	1	0	
FORD	52			5	0	0	0	1	1	
CHRYSLER	87			9	0	0	0	1	0	
TOTAL	198			16	0	0	0	3	1	
					4&5	4&6	4&7	4&8	4&9	
GM	59				0	0	0	0	0	
FORD	52				2	0	0	0	1	
CHRYSLER	87				0	0	0	0	0	
TOTAL	198				2	0	0	0	1	
						5&6	5&7	5&8	5&9	
GM	59					0	0	0	0	
FORD	52					0	0	0	1	
CHRYSLER	87					0	0	0	0	
TOTAL	198					0	0	0	1	
							6&7	6&8	6&9	
GM	59						0	0	0	
FORD	52						0	0	0	
CHRYSLER	87						0	0	0	
TOTAL	198						0	0	0	
								7&8	7&9	
GM	59							0	0	
FORD	52							0	0	
CHRYSLER	87							0	0	
TOTAL	198							0	0	
									8&9	
GM	59								0	
FORD	52								0	
CHRYSLER	87								1	
TOTAL	198								1	

*SYSTEM CODE:
1 - INDUCTION SYSTEM
2 - CARBURETOR/FUEL
3 - IGNITION
4 - EXHAUST GAS RECIRCULATION
5 - AIR PUMP
6 - PCV
7 - EXHAUST
8 - EVAPORATION
9 - ENGINE ASSEMBLY

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM

```
SYSTEM: INDUCTION
-----------------


   SUBSYSTEM / COMPONENT: HEATED AIR INLET DOOR

          1 MALPERFORMANCES / 299 APPLICABLE =   0.33%

            REASON FOR MALPERFORMANCE

      FREQUENCY                  CAUSE

        100.0        HEATED AIR INLET DOOR HINGE BROKEN.


   SUBSYSTEM / COMPONENT: ACTUATING DIAPHRAGM

          2 MALPERFORMANCES / 299 APPLICABLE =   0.67%

            REASON FOR MALPERFORMANCE

      FREQUENCY                  CAUSE

        100.0        LEAKS


   SUBSYSTEM / COMPONENT: TEMPERATURE SENSING VACUUM SWITCH

          4 MALPERFORMANCES / 299 APPLICABLE =   1.34%

            REASON FOR MALPERFORMANCE

      FREQUENCY                  CAUSE

         25.0        COLD WEATHER MODULATOR NIPPLE BROKEN
         75.0        OPENING TEMPERATURE OUT OF SPEC.


   SUBSYSTEM / COMPONENT: DELAY VALVE

          0 MALPERFORMANCES /   1 APPLICABLE =   0.0 %


   SUBSYSTEM / COMPONENT: AIR FILTER ELEMENT

          0 MALPERFORMANCES / 300 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SUBSYSTEM / COMPONENT: HOSES, LINFS AND WIRES

       0 MALPERFORMANCES / 300 APPLICABLE =   0.0 %


SUBSYSTEM / COMPONENT: OTHER

       0 MALPERFORMANCES /   0 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

SYSTEM: CARB / FUEL

SUBSYSTEM / COMPONENT: CARBURETOR ASSEMBLY

4 MALPERFORMANCES / 300 APPLICABLE = 1.33%

REASON FOR MALPERFORMANCE

FREQUENCY	CAUSE
25.0	DISCOVERED IDLE MIXTURE SCREWS BENT AND DAMAGE TO SEATS UPSETTING IDLE
25.0	CARBURETOR TOO RICH OFF IDLE, REPLACED AND PASSED TEST A
25.0	CARB. OVERHAULED AFTER DISCOVERY THAT VAC. PORTS WERE PLUGGED WITH GLUE
25.0	ULTIMATELY DISCOVERED ENLARGED CARBURETOR JET

SUBSYSTEM / COMPONENT: LIMITER CAPS

136 MALPERFORMANCES / 300 APPLICABLE = 45.33%

REASON FOR MALPERFORMANCE

FREQUENCY	CAUSE
80.1	MISSING
18.4	BROKEN
1.5	APPEAR TO HAVE BEEN REMOVED AND REPLACED

SUBSYSTEM / COMPONENT: AS-RECEIVED TAILPIPE IDLE CO MEASUREMENT

113 MALPERFORMANCES / 300 APPLICABLE = 37.67%

REASON FOR MALPERFORMANCE

FREQUENCY	CAUSE
4.4	.51 TO .75%
8.0	.76 TO 1.00%
11.5	1.01 TO 1.50%
5.3	1.51 TO 2.00%
16.8	2.01 TO 3.00%
27.4	3.01 TO 5.00%
26.5	OVER 5.00%

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SUBSYSTEM / COMPONENT: AS-RECIEVED IDLE SPEED

     74 MALPERFORMANCES / 300 APPLICABLE =  24.67%

       REASON FOR MALPERFORMANCE

   FREQUENCY                 CAUSE

      24.3        +101 TO +150 RPM
      18.9        +151 TO +200 RPM
       4.1        +201 TO +250 RPM
       8.1        +251 TO +300 RPM
       1.4        +301 TO +350 RPM
       1.4        +401 TO +450 RPM
      29.7        -101 TO -150 RPM
       4.1        -151 TO -200 RPM
       8.1        GREATER THAN -200 RPM


SUBSYSTEM / COMPONENT: EXTERNAL IDLE ENRICHMENT COMPONENTS

     3 MALPERFORMANCES /  59 APPLICABLE =   5.08%

       REASON FOR MALPERFORMANCE

   FREQUENCY                 CAUSE

      66.7        IE SOLENOID NIPPLE BROKEN
      33.3        IE/EGR SOLENOID ENERGIZED TOO LONG


SUBSYSTEM / COMPONENT: IDLE STOP SOLENOID

     0 MALPERFORMANCES /  36 APPLICABLE =   0.0 %


SUBSYSTEM / COMPONENT: DASHPOT AND OTHER THROTTLE MODULATORS

     1 MALPERFORMANCES /   2 APPLICABLE =  50.00%

       REASON FOR MALPERFORMANCE

   FREQUENCY                 CAUSE

     100.0        LOOSE CONNECTIONS IN THROTTLE STOP SOLENOID


SUBSYSTEM / COMPONENT: FUEL FILTER ELEMENT

     0 MALPERFORMANCES / 299 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SUBSYSTEM / COMPONENT: HOSES, LINES AND WIRES IN CARBURETOR SUBSYSTEM

      2 MALPERFORMANCES / 300 APPLICABLE =   0.67%

        REASON FOR MALPERFORMANCE

    FREQUENCY                CAUSE

      50.0        LINE TO IE VALVE NOT CONNECTED
      50.0        VACUUM LINE TO IE/EGR TIME DELAY SOLENOID MISSING


SUBSYSTEM / COMPONENT: OTHER

      0 MALPERFORMANCES /   0 APPLICABLE =   0.0 %


SUBSYSTEM / COMPONENT: CHOKE ADJUSTMENTS

     31 MALPERFORMANCES / 299 APPLICABLE =  10.37%

        REASON FOR MALPERFORMANCE

    FREQUENCY                CAUSE

       3.2        WITHIN SPECIFIED TOLERANCES
       6.5        1 NR
       6.5        2 NR
       3.2        3 NR
       3.2        1 NL
       6.5        2 NL
       9.7        3 NL
       6.5        GREATER THAN 3 NL
       6.5        .021"R TO .040"R
       6.5        .041"R TO .060"R
      12.9        GREATER THAN .060"R
       6.5        .021"L TO .040"L
       3.2        .041"L TO .060"L
      16.1        GREATER THAN .060"L
       3.2        ACTUAL MEASUREMENT NOT RECORDED


SUBSYSTEM / COMPONENT: CHOKE KICKDOWN OR VACUUM BREAK DIAPHRAGMS

      6 MALPERFORMANCES / 278 APPLICABLE =   2.16%

        REASON FOR MALPERFORMANCE

    FREQUENCY                CAUSE

      83.3        LEAKS
      16.7        UNIT NOT MOUNTED SECURELY
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.).

```
SUBSYSTEM / COMPONENT: ELECTRICAL CONTROLS

       6 MALPERFORMANCES / 204 APPLICABLE =   2.94%

         REASON FOR MALPERFORMANCE

    FREQUENCY                  CAUSE

       50.0        CONTINUITY LONGER THAN TIME ALLOWED
       16.7        CHOKE HEATER RESISTANCE TOO HIGH
       16.7        CONTINUITY SHORTER THAN TIME REQUIRED
       16.7        BATTERY TERMINAL ON CHOKE TIMER BROKEN


SUBSYSTEM / COMPONENT: HOSES, LINES AND WIRES IN THE CHOKE SUBSYSTEM

       5 MALPERFORMANCES / 299 APPLICABLE =   1.67%

         REASON FOR MALPERFORMANCE

    FREQUENCY                  CAUSE

       20.0        VACUUM LINE TO PRIMARY VACUUM BREAK SPLIT
       40.0        WIRE TO CHOKE HEATER NOT CONNECTED
       20.0        VACUUM LINE TO VACUUM BREAK DISCONNECTED
       20.0        SECONDARY VACUUM BREAK TVS BYPASSED


SUBSYSTEM / COMPONENT: EXHAUST HEAT CONTROL VALVE ASSEMBLY

       0 MALPERFORMANCES /  95 APPLICABLE =   0.0 %


SUBSYSTEM / COMPONENT: ACTUATING DIAPHRAGM

       1 MALPERFORMANCES /  64 APPLICABLE =   1.56%

         REASON FOR MALPERFORMANCE

    FREQUENCY                  CAUSE

      100.0        MOUNTING NUTS LOOSE SO ACTUATOR CANNOT FULLY OPEN THE VALVE


SUBSYSTEM / COMPONENT: COOLANT TEMPERATURE SENSING VACUUM SWITCHES

       1 MALPERFORMANCES /  61 APPLICABLE =   1.64%

         REASON FOR MALPERFORMANCE

    FREQUENCY                  CAUSE

      100.0        EFE-EGR TVV OPENS TOO LATE
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SUBSYSTEM / COMPONENT: CHECK VALVE

      0 MALPERFORMANCES /   9 APPLICABLE =   0.0 %


SUBSYSTEM / COMPONENT: HOSES, LINES AND WIRES IN HEAT CONTROL SUBSYSTEM

      1 MALPERFORMANCES / 118 APPLICABLE =   0.85%

        REASON FOR MALPERFORMANCE

    FREQUENCY                   CAUSE

     100.0       VACUUM LINES REROUTED SO THAT EFF AND DISTRIBUTOR RECEIVE FULL VACUUM


SUBSYSTEM / COMPONENT: OTHER ITEMS IN CHOKE AND HEAT CONTROL SUBSYSTEM

      0 MALPERFORMANCES /   0 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

SYSTEM: IGNITION

SUBSYSTEM / COMPONENT: DISTRIBUTOR ASSEMBLY

5 MALPERFORMANCES / 300 APPLICABLE = 1.67%

REASON FOR MALPERFORMANCE

FREQUENCY	CAUSE
20.0	MAXIMUM VACUUM ADVANCE 3 DEG. GREATER THAN TOLERANCE LIMIT
20.0	MECH. ADVANCE 7 DEG. GREATER THAN TOLERANCE LIMIT AT INTERMEDIATE SPEED
20.0	BOTH MECHANICAL AND VACUUM ADVANCE CURVES OUT OF SPEC.
20.0	MAXIMUM VACUUM ADVANCE 9 DEG. GREATER THAN LIMIT
20.0	VACUUM ADVANCE UNIT NOT SECURELY MOUNTED

SUBSYSTEM / COMPONENT: INITIAL TIMING

57 MALPERFORMANCES / 300 APPLICABLE = 19.00%

REASON FOR MALPERFORMANCE

FREQUENCY	CAUSE
7.0	+3 DEG.
15.8	+4 DEG.
7.0	+5 DEG.
5.3	+6 DEG.
12.3	>+6 DEG.
17.5	-3 DEG.
15.8	-4 DEG.
1.8	-5 DEG.
12.3	-6 DEG.
5.3	>-6 DEG.

SUBSYSTEM / COMPONENT: SPARK PLUGS AND WIRES

5 MALPERFORMANCES / 300 APPLICABLE = 1.67%

REASON FOR MALPERFORMANCE

FREQUENCY	CAUSE
20.0	REPLACED PLUGS AS PART OF MAJOR TUNE-UP
20.0	WIRE CORRODED IN DISTRIBUTOR CAP
40.0	INCORRECT PLUGS INSTALLED (NOT RESISTOR TYPE)
20.0	ONE PLUG MISFIRING; CHANGED WITH MAJOR TUNE-UP

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SUBSYSTEM / COMPONENT: VACUUM ADVANCE DIAPHRAGM

       2 MALPERFORMANCES / 298 APPLICABLE =   0.67%

         REASON FOR MALPERFORMANCE

    FREQUENCY                   CAUSE

      100.0        LEAKS


SUBSYSTEM / COMPONENT: SPARK DELAY DEVICES

       4 MALPERFORMANCES /  64 APPLICABLE =   6.25%

         REASON FOR MALPERFORMANCE

    FREQUENCY                   CAUSE

       25.0        OSAC VALVE NIPPLE BROKEN
       75.0        DELAY TIME GREATER THAN SPEC.


SUBSYSTEM / COMPONENT: COOLANT TEMPERATURE SENSING VACUUM SWITCHES

       1 MALPERFORMANCES /  78 APPLICABLE =   1.28%

         REASON FOR MALPERFORMANCE

    FREQUENCY                   CAUSE

      100.0


SUBSYSTEM / COMPONENT: HOSES, LINES AND WIRES

      10 MALPERFORMANCES / 300 APPLICABLE =   3.33%

         REASON FOR MALPERFORMANCE

    FREQUENCY                   CAUSE

       10.0        VACUUM LINES REROUTED SO DISTRIBUTOR RECEIVES FULL VACUUM
       30.0        VACUUM LINE TO DISTRIBUTOR DISCONNECTED
       10.0        TIC VALVE BYPASSED
       20.0        OSAC VALVE BYPASSED
       10.0        VACUUM LINES REROUTED SO DISTRIBUTOR AND EFE RECEIVE FULL VACUUM
       10.0        SPARK DEL. RESTR. APPARENTLY REMOVED ON INSTALLING AFTERMKT. CRUISE CONT.
       10.0        SPARK DELAY VALVE REPLACED WITH IN-LINE CONNECTOR
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SUBSYSTEM / COMPONENT: DWELL

       0 MALPERFORMANCES /   0 APPLICABLE =   0.0 %


SUBSYSTEM / COMPONENT: OTHER

       0 MALPERFORMANCES /   0 APPLICABLE =   0.0 %
```

TABLE ~~A-101~~ THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SYSTEM: EGR
-----------


    SUBSYSTEM / COMPONENT: EGR VALVE ASSEMBLY

          11 MALPERFORMANCES / 298 APPLICABLE =   3.69%

            REASON FOR MALPERFORMANCE

       FREQUENCY                    CAUSE

         18.2        EXCESSIVE CARBON BUILD-UP REMOVED AS PART OF MAJOR TUNE-UP
          9.1        VALVE MOUNTING ARMS BENT CAUSING STEM TO BIND
         72.7        VALVE SEAT DETACHED PREVENTING PROPER SEALING


    SUBSYSTEM / COMPONENT: EGR VALVE EXHAUST BACKPRESSURE TRANSDUCER

          14 MALPERFORMANCES /  69 APPLICABLE =  20.29%

            REASON FOR MALPERFORMANCE

       FREQUENCY                    CAUSE

         92.9        PRESSURE TUBE BROKEN AT JUNCTION WITH DIAPHRAGM HOUSING
          7.1        PRESSURE TUBE CRACKED AT BRAZED JUNCTION WITH DIAPHRAGM HOUSING


    SUBSYSTEM / COMPONENT: TIME DELAY SOLENOID

           3 MALPERFORMANCES /  52 APPLICABLE =   5.77%

            REASON FOR MALPERFORMANCE

       FREQUENCY                    CAUSE

        100.0        TIMER ENERGIZED LONGER THAN SPEC.


    SUBSYSTEM / COMPONENT: VENTURI VACUUM AMPLIFIER

           0 MALPERFORMANCES /  74 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: HIGH SPEED MODULATOR

           0 MALPERFORMANCES /   2 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: VACUUM RESERVOIR

           0 MALPERFORMANCES /  17 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SUBSYSTEM / COMPONENT: COOLANT TEMPERATURE SENSING VACUUM SWITCH

      2 MALPERFORMANCES / 234 APPLICABLE =   0.85%

        REASON FOR MALPERFORMANCE

    FREQUENCY                CAUSE

      50.0       NIPPLE OF CCEGR VALVE BROKEN, THEN GLUED TOGETHER TO PLUG THE LINE
      50.0       EGR EFE TVV OPENS TOO LATE


SUBSYSTEM / COMPONENT: HOSES, LINES AND WIRES

     21 MALPERFORMANCES / 293 APPLICABLE =   7.17%

        REASON FOR MALPERFORMANCE

    FREQUENCY                CAUSE

      47.6       VACUUM LINE TO EGR VALVE PLUGGED
       4.8       VACUUM LINE TO IE/EGR SOLENOID MISSING
      19.0       VACUUM LINE TO EGR VALVE NOT CONNECTED
       9.5       EGR VACUUM PORT AT CARBURETOR FILLED WITH GLUE
       4.8       PLASTIC "T" IN VAC. LINE TO EGR AND AIRPUMP BYPASS VALVES HAS SMALL HOLE
       4.8       SMALL CUT DISCOVERED IN VACUUM LINE TO EGR VALVE
       9.5       VACUUM LINE TO EGR BPT NOT CONNECTED


SUBSYSTEM / COMPONENT: OTHER

      0 MALPERFORMANCES /   1 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SYSTEM: AIR PUMP
----------------


    SUBSYSTEM / COMPONENT: AIR PUMP ASSEMBLY

          0 MALPERFORMANCES / 103 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: BYPASS (DUMP) VALVE

          0 MALPERFORMANCES / 103 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: CHECK VALVE

          0 MALPERFORMANCES / 103 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: ELECTRICAL PVS

          0 MALPERFORMANCES /   7 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: SOLENNOID VACUUM VALVE

          0 MALPERFORMANCES /  11 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: FLOOR PAN SWITCH

          0 MALPERFORMANCES /   3 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: VACUUM DIFFERENTIAL CONTROL

          0 MALPERFORMANCES /  39 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: DRIVE BELT

          0 MALPERFORMANCES / 103 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SUBSYSTEM / COMPONENT: HOSFS. LINFS AND WIRES

       2 MALPERFORMANCES / 104 APPLICABLE =   1.92%

         REASON FOR MALPERFORMANCF

     FPFQUENCY               CAUSE

       50.0        PLASTIC "T" IN VAC. LINE TO EGR AND AIRPUMP BYPASS VALVES HAS SMALL HOLE


SUBSYSTEM / COMPONENT: OTHER

       0 MALPERFORMANCES /   0 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SYSTEM: PCV
-----------


    SUBSYSTEM / COMPONENT: PCV VALVE ASSEMBLY

           0 MALPERFORMANCES / 299 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: FILTERS

           0 MALPERFORMANCES / 299 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: HOSES AND LINES

           2 MALPERFORMANCES / 299 APPLICABLE =   0.67%

             REASON FOR MALPERFORMANCE

        FREQUENCY                   CAUSE

           50.0       VACUUM LINE TO CARBURETOR NOT CONNECTED
           50.0       HOSE TO AIR CLEANER HOUSING NOT CONNECTED


    SUBSYSTEM / COMPONENT: OTHER

           0 MALPERFORMANCES /   0 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SYSTEM: EXHAUST
---------------

    SUBSYSTEM / COMPONENT: EXHAUST MANIFOLD, MUFFLER, TAILPIPE

           0 MALPERFORMANCES / 300 APPLICABLE =   0.0 %

    SUBSYSTEM / COMPONENT: CATALYST

           0 MALPERFORMANCES / 294 APPLICABLE =   0.0 %

    SUBSYSTEM / COMPONENT: OTHER

           0 MALPERFORMANCES /   0 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SYSTEM: EVAPORATIVE CONTROL
---------------------------


    SUBSYSTEM / COMPONENT: CANISTER

          0 MALPERFORMANCES / 300 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: FILTER

          1 MALPERFORMANCES / 300 APPLICABLE =   0.33%

            REASON FOR MALPERFORMANCE

       FREQUENCY                  CAUSE

        100.0        FILTER MISSING


    SUBSYSTEM / COMPONENT: HOSES AND LINES

          3 MALPERFORMANCES / 300 APPLICABLE =   1.00%

            REASON FOR MALPERFORMANCE

       FREQUENCY                  CAUSE

          33.3       HOSE FROM TANK KINKED AT CANISTER
          33.3       HOSES MISSING
          33.3       HOSE FROM CANISTER PINCHED BY COMPRESSOR MOUNTING BRACKET


    SUBSYSTEM / COMPONENT: OTHER

          0 MALPERFORMANCES /   0 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

```
SYSTEM: ENGINE ASSEMBLY
-----------------------


    SUBSYSTEM / COMPONENT: ENGINE ASSEMBLY

           0 MALPERFORMANCES / 300 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: ENGINE OIL AND OIL FILTER

           2 MALPERFORMANCES / 300 APPLICABLE =   0.67%

             REASON FOR MALPERFORMANCE

       FREQUENCY                    CAUSE

         100.0        CHANGED AS PART OF MAJOR TUNE-UP


    SUBSYSTEM / COMPONENT: COOLING SYSTEM

           1 MALPERFORMANCES / 300 APPLICABLE =   0.33%

             REASON FOR MALPERFORMANCE

       FREQUENCY                    CAUSE

         100.0        RADIATOR CAP FAILED AND WAS REPLACED AT MAJOR TUNE-UP


    SUBSYSTEM / COMPONENT: MECHANICAL VALVE ADJUSTMENT

           0 MALPERFORMANCES /  56 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: MANIFOLD MOUNTING BOLTS

           0 MALPERFORMANCES / 300 APPLICABLE =   0.0 %


    SUBSYSTEM / COMPONENT: DRIVE BELTS

           0 MALPERFORMANCES / 300 APPLICABLE =   0.0 %
```

TABLE A-101 THE SPECIFIC REASONS FOR COMPONENT/SUBSYSTEM MALPERFORMANCE AND THE FREQUENCY OF THE REASONS BY SYSTEM (cont.)

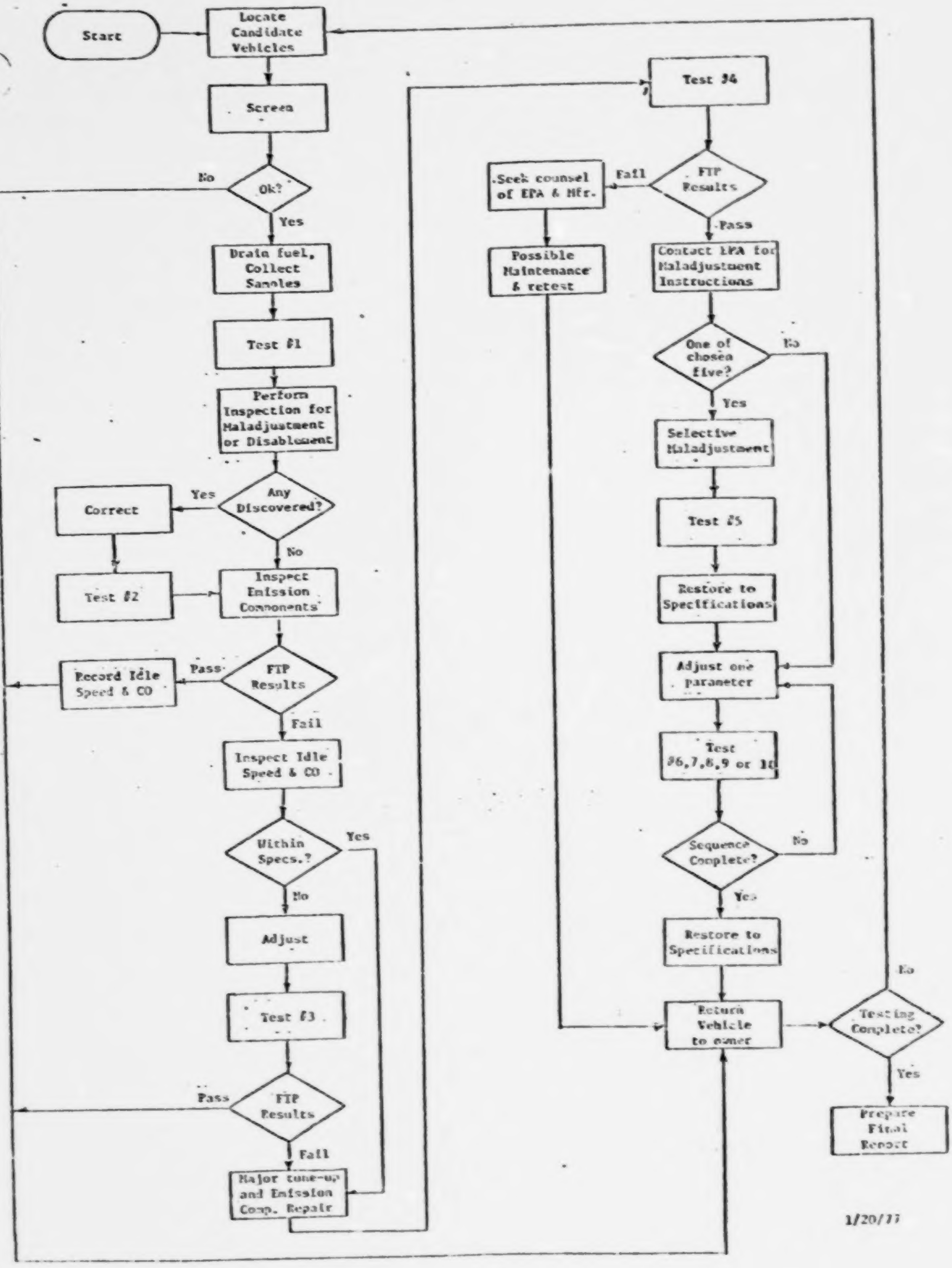
```
SUBSYSTEM / COMPONENT: HOSES, LINFS AND WIRES

      0 MALPERFORMANCES / 300 APPLICABLE =   0.0 %


SUBSYSTEM / COMPONENT: OTHER

      0 MALPERFORMANCES /   0 APPLICABLE =   0.0 %
```

TABLE A-102 RESTORATIVE MAINTENANCE EVALUATION TEST PLAN


Start
Locate Candidate Vehicles
Screen
Ok?
No
Yes
Drain fuel, Collect Samples
Test #1
Perform Inspection for Maladjustment or Disablement
Any Discovered?
Yes
No
Correct
Test #2
Inspect Emission Components
FTP Results
Pass
Fail
Record Idle Speed & CO
Inspect Idle Speed & CO
Within Specs.?
Yes
No
Adjust
Test #3
FTP Results
Pass
Fail
Major tune-up and Emission Comp. Repair
Test #4
FTP Results
Fail
Pass
Seek counsel of EPA & Mfr.
Possible Maintenance & retest
Contact EPA for Maladjustment Instructions
One of chosen five?
No
Yes
Selective Maladjustment
Test #5
Restore to Specifications
Adjust one parameter
Test #6,7,8,9 or 10
Sequence Complete?
No
Yes
Restore to Specifications
Return Vehicle to owner
Testing Complete?
No
Yes
Prepare Final Report

1/20/77

RESTORATIVE MAINTENANCE EVALUATION

Narrative Test Procedures
(See flow chart for sequence)

LOCATE CANDIDATE VEHICLES - Potential test vehicles will be drawn from the general public using commercially-available mailing lists or other means designed to ensure overall randomness of the sample.

SCREEN - Willing owners whose vehicles appear to meet the vehicle configuration criteria will be contacted to verify the information provided and to obtain any missing items. At this time, the owner will be questioned with regard to vehicle age and mileage, types of usage, and extent of possible driveline modifications. He will also be asked to allow a tune-up or minor adjustments to be performed, if necessary, and informed of the incentive package and possible test duration. The owner should also be informed that his vehicle will be returned to him tuned to manufacturer's specifications, in a condition that allows it to pass its emission standards, or both. If the owner remains willing and the vehicle still appears to be an acceptable candidate, the VIN will be made available to the manufacturer's representative.

Upon arrival at the laboratory, the candidate vehicle will be given a cursory examination to determine its suitability for the program. The results of this may be noted on the Maladjustment and Disablement Inspection Form although no corrective actions are to be taken at this time. Normally, the complete inspection will be performed in conjunction with the Emission Control Component Function Check following the initial test sequence. Also during this screening process, a sample of tank fuel will be drawn and tested for lead content and the owner will be interviewed to complete the questionnaire.

The outcome of this portion of the sequence will be to accept or reject the vehicle for further testing. A modest amount of maladjustment and disablement on some vehicles is expected. However, vehicles which have undergone modifications of any kind which are not readily, inexpensively or ultimately restorable will be rejected from the sample at this point. Normally, the contractor will make the determination although more complex decisions may be made jointly be representatives of the contractor, manufacturer and EPA. While a failing mark in a number of areas would not disqualify a candidate vehicle, immediate rejection will result from excessive age or mileage, extensive modifications, evidence of improper use, or indications that a catalyst-equipped vehicle has used leaded fuel. If accepted, the owner will complete the remaining loan vehicle and test agreement forms and his vehicle will be retained for the program.

DRAIN FUEL, COLLECT SAMPLES - Once accepted into the program, the fuel in each vehicle will be drained, with two samples taken and stored in containers approved for shipping by UPS. One of the samples will be made available to the manufacturer while the other will be shipped to a laboratory designated by the EPA Project Officer.

TEST - The actual test sequence on each vehicle begins with the addition of test fuel to 40% of tank fuel volume, rounded to the nearest gallon. The vehicle shall then be driven for at least ten minutes on city streets to ensure the test fuel has fully purged the system. During this time, a driveability evaluation of the vehicle in a warmed-up condition will be conducted. Cold-start operation will be evaluated and recorded during the subsequent FTP driving cycle.

The dynamometer test sequence begins after the prescribed soak period. Tests to be performed are the 1975 FTP (but without fuel tank heat build or evaporative emission measurements), the Highway Fuel Economy Test (HFET) and the five short cycles. Appropriate dynamometer settings (inertia weight, horsepower, air conditioning load) and vehicle starting procedures will be provided by the manufacturer's representative. All test settings and vehicle specifications are to be "as-certified". No field fixes or running changes may be added without prior approval of the EPA Project Officer.

Immediately after the dynamometer sequence, basic engine parameters shall be measured and recorded. Emission test results should also be calculated to permit a timely review of the test and to expedite routing of the test vehicle through the program.

PERFORM INSPECTION FOR MALADJUSTMENT AND DISABLEMENT - This procedure requires the use of the Maladjustment and Disablement Inspection Form and may be conducted in conjunction with the functional checks of the emission control components. For the purpose of this examination, the pass-fail decision for each system will be based on whether it has experienced malajustment or disablement. Areas that are deficient due to deterioration or production defects are disregarded here but will be treated as failures during the functional checks of the emission control components.

ANY DISCOVERED - This block requires a decision based on review of the Maladjustment and Disablement Inspection Form. Failures discovered in areas other than limiter caps, idle speed and idle CO will cause a "yes" answer, correction and another test sequence.

CORRECT - Maladjusted or disabled items, except those described above, will be corrected. While out-of-spec idle speed and CO are also considered maladjustment, their correction will be teated separately. The actions performed will be recorded in the "Action" column on the Maladjustment and Disablement Inspection Form with comments as appropriate.

INSPECT EMISSION COMPONENTS - Each vehicle in the program will undergo a functional check of each of the emission control devices and other emission related components. Precise procedures and specifications for these inspections are found in the shop manuals but have been summarized on the "Emission Component Function Check" worksheet. At this time, the individual devices and systems are only to be inspected with the conditions recorded. Any corrective actions required will normally be performed later in addition to the major tune-up.

FTP RESULTS - This decision will be based on the outcome of the preceding test sequence with regard to the standards applicable to each test vehicle. Thus, results of tests on California vehicles will be compared to the California Standards while others will be subject to Federal Standards.

RECORD IDLE SPEED AND CO - Vehicles which pass test #1 or #2 will be returned to their owners. Before the vehicle is released, the idle speed and idle mixture will be measured and recorded on the Emission Component Function Check worksheet. Idle speed will be measured under the conditions listed on the vehicle's emission sticker. Idle mixture will be evaluated on Ford vehicles using the artifical enrichment method, on Chrysler vehicles with a CO reading ahead of the catalyst and on GM vehicles with a tailpipe CO measurement.

INSPECT IDLE SPEED AND CO - Chrysler and Ford vehicles which reach this point will be inspected for idle speed and idle CO concentration using the procedures specified by the manufacturer. Because the nature of General Motor's procedure for idle CO settings precludes inspection, these vehicles will proceed directly to the "Adjust" block. Results of these adjustments are to be recorded on the "Idle CO and RPM Inspection and Adjustments" form.

WITHIN SPECIFICATIONS - Chrysler and Ford vehicles may be found to be within tolerances for both parameters. Such vehicles will not be adjusted but will immediately receive the required maintenance and repair of emission control devices.

ADJUST - General Motors vehicles and ones of the other manufacturers which are found to be out of specifications will receive the appropriate adjustments. In case of malfunctioning emission control devices which would prevent proper settings (e.g. idle stop solenoid), these may be corrected at this time with appropriate notations made on the "Emission Component Function Check" worksheet. Following this procedure, the vehicle shall be given another test sequence with FTP results again determining its disposition in the program.

MAJOR TUNE-UP AND EMISSION COMPONENT REPAIR - Vehicles which arrive at this block will undergo correction of malfunctioning emission control devices and other emission-related components, recording such actions on the "Emission Component Function Check" worksheet. The major tune-up shall be performed as prescribed in the appropriate shop manual using the "Schedule Maintenance" for reporting of findings and actions. The manufacturer's representative may provide assistance and guidance in the performance of these tasks. All replacements shall be made with OEM parts. A number of local auto dealers are to be contacted in an attempt to obtain proper replacements for emission components. Responses of dealers may be noted on the "Function Check" of "Maintenance" Forms. In some cases, the manufacturer's representative may actually provide some emission-related parts which are difficult to obtain from local sources. This will not, however, reduce the requirement for contact with local dealers.

SEEK COUNSEL OF EPA AND MANUFACTURER - Vehicles which are unable to pass the FTP after a major tune-up and correction of all malfunctioning emission control devices will arrive at this block. A substantial number of these should be very close to the standards and no further action will be warranted. However, in some cases, the manufacturer's representative may choose to examine the vehicle and its test results more closely to determine a possible explanatation. This could result in previously undiscovered maladjustments or disablements or in an extraordinary problem with the vehicle itself. He may also wish to perform some additional adjustments on the vehicle or perform an applicable field fix or running change. While these instances are to be handled between the manufacturer and EPA, there may be cases in which the vehicle will receive another test. Unless suitable financial arrangements are made with the contractor, any additional tests or maintenance will be within the original amount of contracted effort.

ONE OF CHOSEN 5 - Although each vehicle which passes test #4 will be subject to further maladjustment, disablement and retesting, as many as five vehicles from each manufacturer will be chosen to pass through the "Selective Maladjustment" loop. The contractor shall notify the EPA project Officer as each vehicle reaches this portion of the program. The Project Officer will then determine whether the vehicle is one of the chosen five.

SELECTIVE MALADJUSTMENT - This will represent what is considered to be a prevalent form of modification to the make/engine family under test. It will consist of some combination of engine parameter readjustments as well as possible alteration of vacuum, mechanical or electrical signals. The settings and other actions to be performed will be determined by the EPA Project Officer after the vehicle has been selected for this phase of the project. This will be done only once on each vehicle. Following this "Selective Maladjustment," the vehicle will be tested and restored to its condition prior to the test.

RESTORE TO SPECIFICATIONS - This block provides for restoration of the vehicle's engine and emission control system to manufacturer's specifications prior to further testing or return to its owner. Since vehicles which have arrived at this later stage of the program have received extensive inspection and maintenance earlier, this action is simply the reversal of the "Selective Maladjustment" or "Readjustment" actions.

ADJUST ONE PARAMETER - The purpose of this loop is to identify and quantify the effect of individual or multiple parameter readjustments on exhaust emissions and fuel economy. At this point, one or more of the basic parameters such as idle RPM, Idle CO or ignition timing will be changed, holding the others constant. Alteration of vacuum, electrical, or mechanical signals may also be involved. The EPA Project Officer will provide the precise settings for each vehicle after it has been accepted into this portion of the program. After this adjustment, the vehicle will receive another test sequence.

SEQUENCE COMPLETE? - This decision is based on the number of tests remaining in the contracted effort but will also be based on the current needs for information on certain vehicles and in various areas of readjustments. Normally, each vehicle will cycle through this loop four times. The EPA Project Officer will determine the length of the sequence on an individual basis for each vehicle. Once the sequence is completed, the vehicle will be readjusted to manufacturer's specifications.

RETURN VEHICLE TO OWNER - The contractor will prepare the vehicle for return to its owner as well as fulfill the provisions of the incentive package.

TESTING COMPLETE? - Once the prescribed number and types of vehicles have been procured and successfully tested, the testing portion of the project is complete.

PREPARE FINAL REPORT - The data gathered by the contractor is to be assembled into a final report using a format supplied by the EPA Project Officer. This report will include a narrative description of the project, summary tables and individual test results on each vehicle.

TABLE A-103 MALPERFORMANCE BY VEHICLE AND SYSTEM FOR ALL VEHICLES IN AS-RECEIVED CONDITION

MILEAGE	MANUFACT	CID	MILEAGE	MANUFACT	MAKECODE	SYSTEM1	SYSTEM2	SYSTEM3	SYSTEM4	SYSTEM5	SYSTEM6	SYSTEM7	SYSTEM8	SYSTEM9
696	FORD	460	695	FORD	07	OK	OK	OK	OK	OK	OK	OK	OK	OK
1028	CHRYSLER	318	1028	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
1089	CHRYSLER	318	1089	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
1209	CHRYSLER	225	1209	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
1357	CHRYSLER	225	1357	CHRYSLER	12	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
1412	GM	305	1412	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
1445	FORD	351	1445	FORD	06	OK	OK	FAILURE	OK	OK	OK	OK	OK	OK
1514	GM	305	1514	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
1543	CHRYSLER	225	1543	CHRYSLER	10	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
1685	CHRYSLER	225	1685	CHRYSLER	10	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
1956	FORD	171	1956	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
2007	CHRYSLER	225	2007	CHRYSLER	10	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
2222	GM	350	2222	GM	02	OK	OK	OK	FAILURE	OK	OK	OK	OK	OK
2343	CHRYSLER	318	2343	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
2361	FORD	250	2361	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
2470	FORD	460	2470	FORD	07	OK	OK	OK	OK	OK	OK	OK	OK	OK
2523	GM	500	2523	GM	02	OK	OK	OK	OK	OK	OK	OK	OK	OK
2529	CHRYSLER	400	2529	CHRYSLER	09	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK	OK
2610	FORD	171	2610	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
2653	GM	305	2653	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
2665	FORD	351	2665	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
2726	CHRYSLER	318	2726	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
2776	CHRYSLER	225	2776	CHRYSLER	10	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
2885	FORD	250	2885	FORD	08	OK	OK	OK	OK	OK	OK	OK	OK	OK
2922	GM	260	2922	GM	01	OK	OK	OK	OK	OK	OK	OK	OK	OK
2933	FORD	250	2933	FORD	05	OK	OK	OK	FAILURE	OK	OK	OK	OK	OK
2951	GM	455	2951	GM	04	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
3035	GM	305	3035	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
3088	GM	305	3088	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
3106	GM	350	3106	GM	04	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
3138	FORD	250	3138	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
3152	CHRYSLER	400	3152	CHRYSLER	10	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
3164	CHRYSLER	318	3164	CHRYSLER	10	OK	FAILURE	OK	OK	OK	FAILURE	OK	OK	OK
3249	FORD	302	3249	FORD	08	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
3251	GM	350	3251	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
3262	GM	350	3262	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
3232	FORD	200	3232	FORD	05	FAILURE	OK	OK	OK	OK	OK	OK	OK	OK
3289	GM	231	3289	GM	01	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK	OK
3341	CHRYSLER	318	3341	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
3344	FORD	250	3344	FORD	08	OK	OK	FAILURE	OK	OK	OK	OK	OK	OK
3555	GM	500	3555	GM	02	OK	OK	OK	OK	OK	OK	OK	OK	OK
3695	GM	350	3695	GM	05	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
3706	GM	350	3706	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
3742	CHRYSLER	318	3742	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
3746	FORD	302	3746	FORD	06	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
3795	CHRYSLER	225	3795	CHRYSLER	10	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
3798	FORD	302	3798	FORD	08	OK	FAILURE	OK	FAILURE	FAILURE	OK	OK	OK	OK
3857	FORD	400	3857	FORD	08	OK	OK	OK	OK	OK	OK	OK	OK	OK
3912	GM	260	3912	GM	04	OK	OK	OK	OK	OK	OK	OK	OK	OK
3941	GM	305	3941	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
3966	CHRYSLER	360	3966	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
4025	CHRYSLER	225	4025	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK

TABLE A-103 MALPERFORMANCE BY VEHICLE AND SYSTEM FOR ALL VEHICLES IN AS-RECEIVED CONDITION (cont.)

MILEAGE	MANUFACT	CID	MILEAGE	MANUFACT	MAKECODE	SYSTEM1	SYSTEM2	SYSTEM3	SYSTEM4	SYSTEM5	SYSTEM6	SYSTEM7	SYSTEM8	SYSTEM9
4085	FORD	400	4085	FORD	06	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK	OK
4104	FORD	400	4104	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
4163	GM	350	4163	GM	04	OK	OK	OK	OK	OK	OK	OK	OK	OK
4230	FORD	200	4230	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
4348	CHRYSLER	360	4348	CHRYSLER	10	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
4431	CHRYSLER	225	4431	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
4442	FORD	351	4442	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
4487	CHRYSLER	400	4487	CHRYSLER	09	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
4504	GM	400	4504	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
4581	CHRYSLER	225	4581	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
4646	CHRYSLER	225	4646	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
4682	CHRYSLER	225	4682	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
4715	CHRYSLER	318	4715	CHRYSLER	10	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
4767	GM	250	4767	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
4821	CHRYSLER	318	4821	CHRYSLER	10	OK	OK	OK	OK	OK	OK	OK	OK	OK
4823	CHRYSLER	318	4823	CHRYSLER	12	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
4849	GM	500	4849	GM	02	OK	OK	OK	OK	OK	OK	OK	OK	OK
4854	CHRYSLER	318	4854	CHRYSLER	10	FAILURE	OK	FAILURE	OK	OK	OK	OK	FAILURE	OK
4858	GM	305	4858	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
4859	CHRYSLER	318	4859	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
4868	FORD	460	4868	FORD	07	OK	OK	OK	OK	OK	OK	OK	OK	OK
4894	CHRYSLER	318	4894	CHRYSLER	10	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
4904	CHRYSLER	225	4904	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
4922	CHRYSLER	225	4922	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
4933	FORD	171	4933	FORD	06	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	FAILURE	OK
4935	GM	350	4936	GM	04	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
4942	FORD	460	4942	FORD	07	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK	OK
5018	CHRYSLER	400	5018	CHRYSLER	09	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
5075	FORD	460	5075	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
5084	GM	085	5064	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
5171	FORD	171	5171	FORD	06	FAILURE	OK	OK	OK	OK	OK	OK	OK	OK
5273	FORD	140	5273	FORD	06	OK	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK
5278	CHRYSLER	318	5278	CHRYSLER	12	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
5289	FORD	302	5289	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
5303	CHRYSLER	318	5303	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
5322	GM	455	5322	GM	04	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
5352	CHRYSLER	225	5352	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
5370	FORD	351	5370	FORD	08	OK	OK	OK	OK	OK	OK	OK	OK	OK
5401	GM	350	5401	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
5433	FORD	400	5433	FORD	6	FAILURE	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
5436	FORD	351	5436	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
5538	FORD	351	5538	FORD	06	OK	OK	FAILURE	OK	OK	OK	OK	OK	OK
5588	GM	400	5588	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
5602	GM	140	5602	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
5639	GM	350	5639	GM	03	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
5670	CHRYSLER	225	5670	CHRYSLER	12	OK	OK	OK	OK	OK	OK	OK	OK	OK
5738	FORD	250	5738	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
5833	CHRYSLER	318	5833	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
5870	CHRYSLER	225	5870	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
5875	CHRYSLER	360	5875	CHRYSLER	12	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
5899	GM	231	5899	GM	01	OK	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK
5902	FORD	140	5902	FORD	06	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK

TABLE A-103 MALPERFORMANCE BY VEHICLE AND SYSTEM FOR ALL VEHICLES IN AS-RECEIVED CONDITION (cont.)

MILEAGE	MANUFACT	CID	MILEAGE	MANUFACT	MAKECODE	SYSTEM1	SYSTEM2	SYSTEM3	SYSTEM4	SYSTEM5	SYSTEM6	SYSTEM7	SYSTEM8	SYSTEM9
5998	FORD	400	5998	FORD	06	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
6054	FORD	351	6054	FORD	09	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
6133	GM	400	6133	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
6144	FORD	302	6144	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
6248	CHRYSLER	400	6248	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
6291	GM	350	6291	GM	05	OK	OK	OK	OK	OK	OK	OK	OK	OK
6299	FORD	351	6299	FORD	08	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
6406	FORD	250	6406	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
6426	CHRYSLER	318	6426	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
6434	FORD	250	6434	FORD	06	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
6497	GM	140	6497	GM	03	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
6521	CHRYSLER	360	6521	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
6545	GM	305	6545	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
6546	GM	350	6546	GM	03	OK	OK	FAILURE	OK	OK	OK	OK	OK	OK
6621	CHRYSLER	225	6621	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
6786	FORD	351	6786	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
6793	FORD	302	6793	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
6819	CHRYSLER	225	6819	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
6903	FORD	250	6903	FORD	3	OK	OK	OK	OK	OK	OK	OK	OK	OK
6982	FORD	302	6982	FORD	05	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
6983	FORD	400	6983	FORD	6	OK	OK	OK	OK	OK	OK	OK	OK	OK
6984	FORD	351	6984	FORD	06	OK	OK	OK	FAILURE	OK	OK	OK	OK	OK
7031	CHRYSLER	318	7031	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
7059	FORD	171	7059	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
7070	FORD	250	7070	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
7090	CHRYSLER	360	7090	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
7114	CHRYSLER	360	7114	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
7115	GM	350	7115	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
7143	GM	350	7143	GM	03	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
7169	GM	305	7169	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
7245	GM	400	7245	GM	05	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
7293	CHRYSLER	225	7293	CHRYSLER	10	OK	OK	OK	OK	OK	OK	OK	OK	OK
7401	GM	350	7401	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
7403	GM	350	7403	GM	04	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
7598	FORD	302	7598	FORD	06	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK	OK
7637	CHRYSLER	400	7637	CHRYSLER	09	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
7730	FORD	302	7730	FORD	06	OK	FAILURE	OK	FAILURE	OK	OK	OK	FAILURE	FAILURE
7765	CHRYSLER	440	7765	CHRYSLER	09	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
7774	FORD	400	7774	FORD	06	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
7785	GM	140	7785	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
7817	FORD	250	7817	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	FAILURE
7854	FORD	351	7854	FORD	6	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
7857	CHRYSLER	318	7857	CHRYSLER	10	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK	OK
7882	GM	455	7882	GM	04	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
7890	FORD	351	7890	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
7896	CHRYSLER	360	7896	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
7964	FORD	140	7964	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
7991	FORD	351	7991	FORD	08	OK	OK	OK	FAILURE	OK	OK	OK	OK	OK
8078	GM	350	8078	GM	04	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
8107	CHRYSLER	360	8107	CHRYSLER	10	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
8129	FORD	351	8129	FORD	8	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
8183	GM	455	8183	GM	04	OK	OK	OK	OK	OK	OK	OK	OK	OK

TABLE A-103 MALPERFORMANCE BY VEHICLE AND SYSTEM FOR ALL VEHICLES IN AS-RECEIVED CONDITION (cont.)

MILEAGE	MANUFACT	CID	MILEAGE	MANUFACT	MAKECODE	SYSTEM1	SYSTEM2	SYSTEM3	SYSTEM4	SYSTEM5	SYSTEM6	SYSTEM7	SYSTEM8	SYSTEM9
8189	CHRYSLER	360	8189	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
8205	CHRYSLER	225	8205	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
8223	FORD	400	8223	FORD	06	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
8262	FORD	351	8262	FORD	06	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
8350	FORD	351	8350	FORD	6	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
8361	GM	305	8361	GM	03	FAILURE	OK	OK	OK	OK	OK	OK	OK	OK
8422	GM	350	8422	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
8475	GM	500	8475	GM	02	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
8597	CHRYSLER	318	8597	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
8637	CHRYSLER	225	8637	CHRYSLER	12	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
8642	FORD	140	8642	FORD	05	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
8707	CHRYSLER	225	8707	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
8747	CHRYSLER	318	8747	CHRYSLER	12	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
8757	GM	500	8757	GM	02	OK	OK	OK	OK	OK	OK	OK	OK	OK
8776	GM	350	8776	GM	04	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
8789	CHRYSLER	225	8789	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
8988	CHRYSLER	360	8988	CHRYSLER	09	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
8994	FORD	302	8994	FORD	08	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
9018	FORD	171	9018	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9019	CHRYSLER	225	9019	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9027	FORD	400	9027	FORD	06	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK	OK
9093	GM	231	9093	GM	01	OK	OK	OK	OK	OK	OK	OK	OK	OK
9101	CHRYSLER	225	9101	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9191	FORD	400	9191	FORD	08	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9194	FORD	140	9194	FORD	06	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
9203	FORD	351	9203	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9206	GM	260	9206	GM	04	OK	OK	FAILURE	OK	OK	OK	OK	OK	OK
9236	FORD	302	9236	FORD	08	OK	OK	OK	FAILURE	OK	OK	OK	OK	OK
9237	CHRYSLER	225	9237	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9252	CHRYSLER	225	9252	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9269	GM	400	9269	GM	05	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9278	GM	260	9278	GM	05	OK	OK	OK	OK	OK	OK	OK	OK	OK
9326	CHRYSLER	225	9326	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9377	GM	140	9377	GM	05	OK	OK	OK	OK	OK	OK	OK	OK	OK
9383	CHRYSLER	225	9383	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9400	CHRYSLER	360	9400	CHRYSLER	09	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK	OK
9469	GM	305	9469	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9470	CHRYSLER	225	9470	CHRYSLER	10	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
9500	CHRYSLER	318	9500	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9559	CHRYSLER	350	9559	CHRYSLER	10	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
9644	GM	250	9644	GM	05	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9688	GM	350	9688	GM	01	OK	OK	OK	OK	OK	OK	OK	OK	OK
9698	GM	305	9698	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9716	GM	350	9716	GM	01	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9741	GM	350	9741	GM	01	OK	OK	OK	OK	OK	OK	OK	OK	OK
9754	CHRYSLER	360	9754	CHRYSLER	09	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
9775	GM	350	9775	GM	05	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
9810	CHRYSLER	318	9810	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
9827	FORD	400	9827	FORD	3	OK	FAILURE	OK	OK	OK	FAILURE	OK	OK	OK
9948	CHRYSLER	318	9948	CHRYSLER	10	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
9972	CHRYSLER	360	9972	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
10133	CHRYSLER	318	10133	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK

TABLE A-103 MALPERFORMANCE BY VEHICLE AND SYSTEM FOR ALL VEHICLES IN AS-RECEIVED CONDITION (cont.)

MILEAGE	MANUFACT	CID	MILEAGE	MANUFACT	MAKECODE	SYSTEM1	SYSTEM2	SYSTEM3	SYSTEM4	SYSTEM5	SYSTEM6	SYSTEM7	SYSTEM8	SYSTEM9
10239	FORD	460	10239	FORD	6	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
10290	FORD	400	10290	FORD	8	OK	OK	OK	FAILURE	OK	OK	OK	OK	OK
10291	CHRYSLER	400	10291	CHRYSLER	09	FAILURE	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
10385	GM	455	10385	GM	01	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
10387	FORD	351	10387	FORD	6	OK	OK	OK	OK	OK	OK	OK	OK	OK
10463	GM	350	10463	GM	05	OK	OK	FAILURE	OK	OK	OK	OK	OK	OK
10567	GM	400	10567	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
10603	CHRYSLER	225	10603	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
10665	FORD	460	10665	FORD	7	OK	OK	OK	OK	OK	OK	OK	OK	OK
10698	FORD	250	10698	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
10748	GM	231	10748	GM	01	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
10917	CHRYSLER	225	10917	CHRYSLER	12	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
10932	GM	400	10932	GM	03	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
10968	CHRYSLER	318	10968	CHRYSLER	10	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
10990	GM	350	10990	GM	04	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
10995	GM	350	10995	GM	05	OK	FAILURE	FAILURE	OK	OK	OK	OK	FAILURE	OK
11009	GM	140	11009	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
11039	CHRYSLER	318	11039	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
11173	GM	400	11173	GM	05	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
11323	CHRYSLER	318	11323	CHRYSLER	10	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
11401	GM	85	11401	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
11457	GM	305	11457	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
11471	GM	260	11471	GM	05	OK	OK	OK	OK	OK	OK	OK	OK	OK
11499	CHRYSLER	360	11499	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
11508	FORD	140	11508	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
11509	FORD	302	11509	FORD	08	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
11514	GM	350	11514	GM	01	OK	OK	OK	FAILURE	OK	OK	OK	OK	OK
11542	FORD	250	11542	FORD	05	OK	OK	OK	OK	OK	OK	OK	OK	OK
11543	CHRYSLER	225	11543	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
11543	GM	350	11543	GM	04	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
11571	CHRYSLER	318	11571	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
11574	CHRYSLER	400	11574	CHRYSLER	09	OK	OK	FAILURE	OK	OK	OK	OK	OK	OK
11584	GM	350	11584	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
11595	FORD	351	11595	FORD	6	OK	OK	OK	OK	OK	OK	OK	OK	OK
11613	FORD	351	11613	FORD	6	OK	FAILURE	OK	FAILURE	FAILURE	OK	OK	OK	FAILURE
11626	CHRYSLER	225	11626	CHRYSLER	12	OK	OK	OK	OK	OK	OK	OK	OK	OK
11675	CHRYSLER	318	11675	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
11682	CHRYSLER	318	11682	CHRYSLER	10	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK	OK
11687	GM	455	11687	GM	04	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
11807	CHRYSLER	225	11807	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
11928	GM	350	11928	GM	01	OK	OK	OK	OK	OK	OK	OK	OK	OK
11930	GM	400	11930	GM	03	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
12030	GM	455	12030	GM	01	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
12131	CHRYSLER	225	12131	CHRYSLER	10	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
12198	GM	350	12198	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
12201	GM	400	12201	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
12205	GM	350	12205	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
12222	GM	350	12222	GM	04	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
12253	CHRYSLER	225	12253	CHRYSLER	12	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK	OK
12274	GM	140	12274	GM	05	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
12374	FORD	351	12374	FORD	08	OK	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK
12430	CHRYSLER	225	12430	CHRYSLER	12	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK

TABLE A-103 MALPERFORMANCE BY VEHICLE AND SYSTEM FOR ALL VEHICLES IN AS-RECEIVED CONDITION (cont.)

MILEAGE	MANUFACT	CID	MILEAGE	MANUFACT	MAKECODE	SYSTEM1	SYSTEM2	SYSTEM3	SYSTEM4	SYSTEM5	SYSTEM6	SYSTEM7	SYSTEM8	SYSTEM9
12433	CHRYSLER	400	12433	CHRYSLER	09	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
12478	CHRYSLER	400	12478	CHRYSLER	09	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
12570	GM	350	12570	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
12710	GM	350	12710	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
12881	GM	400	12881	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
12898	FORD	400	12898	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
12910	FORD	351	12910	FORD	8	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
12990	FORD	302	12990	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
12996	GM	350	12996	GM	04	OK	OK	FAILURE	OK	OK	OK	OK	OK	OK
13135	FORD	351	13135	FORD	06	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
13292	GM	455	13292	GM	04	OK	OK	OK	OK	OK	OK	OK	OK	OK
13302	FORD	140	13302	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
13354	FORD	140	13354	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
13377	GM	260	13377	GM	05	OK	OK	OK	FAILURE	OK	OK	OK	OK	OK
13411	GM	455	13411	GM	01	OK	OK	FAILURE	OK	OK	OK	OK	OK	OK
13470	GM	250	13470	GM	03	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
13490	FORD	351	13490	FORD	6	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
13495	FORD	460	13495	FORD	7	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
13575	FORD	250	13575	FORD	06	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
13584	GM	350	13584	GM	01	OK	OK	OK	OK	OK	OK	OK	OK	OK
13593	FORD	250	13593	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
13699	FORD	351	13699	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
13760	FORD	351	13760	FORD	06	OK	OK	OK	OK	OK	OK	OK	OK	OK
13862	FORD	351	13862	FORD	06	OK	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
13942	FORD	351	13942	FORD	06	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
13947	FORD	140	13947	FORD	06	OK	OK	FAILURE	OK	OK	OK	OK	OK	OK
14050	FORD	351	14050	FORD	08	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
14207	CHRYSLER	360	14207	CHRYSLER	10	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
14280	GM	350	14280	GM	05	OK	OK	OK	OK	OK	OK	OK	OK	OK
14293	GM	350	14293	GM	01	OK	FAILURE	OK	FAILURE	OK	OK	OK	OK	OK
14312	FORD	351	14312	FORD	06	FAILURE	FAILURE	FAILURE	FAILURE	OK	OK	OK	OK	OK
14328	GM	350	14328	GM	03	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
14334	CHRYSLER	225	14334	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
14336	CHRYSLER	225	14336	CHRYSLER	12	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
14518	GM	250	14518	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
14525	FORD	351	14525	FORD	06	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
14648	GM	350	14648	GM	03	OK	FAILURE	OK	OK	OK	OK	OK	OK	OK
14668	FORD	400	14668	FORD	06	OK	FAILURE	FAILURE	OK	OK	OK	OK	OK	OK
14705	GM	350	14705	GM	03	OK	OK	OK	OK	OK	OK	OK	OK	OK
14730	FORD	460	14730	FORD	6	OK	OK	OK	OK	OK	OK	OK	OK	OK

APPENDIX B

TABLES B-1 THROUGH B-41

TABLE B-1

FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMY
BY CITY FOR TEST SEQUENCE 1

CITY	# CARS	HYDROCARBONS (gm/mi)		CARBON MONOXIDE (gm/mi)		NO_x* (gm/mi)		URBAN FUEL ECONOMY (mi/gal)		HIGHWAY FUEL ECONOMY (mi/gal)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC		HARMONIC		HARMONIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
CHICAGO	100	1.26	1.01	19.74	22.25	2.86	1.37	13.74	2.59	18.98	3.28
DETROIT	100	1.36	1.02	19.63	29.95	2.55	0.90	13.87	2.65	19.75	3.15
WASHINGTON	100	1.34	0.95	21.47	23.25	3.05	1.33	13.50	2.34	19.68	3.50
TOTAL	300	1.32	0.99	20.26	23.10	2.82	1.23	13.70	2.53	19.46	3.32

*NO_x CORRECTED FOR HUMIDITY

TABLE B-2

FEDERAL TEST PROCEDURE (FTP) EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMY BY MANUFACTURER FOR TEST SEQUENCE 1

MANUFACTURER	# CARS	HYDROCARBONS (gm/mi)		CARBON MONOXIDE (gm/mi)		NO_x* (gm/mi)		URBAN FUEL ECONOMY (mi/gal)		HIGHWAY FUEL ECONOMY (mi/gal)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC		HARMONIC		HARMONIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
GENERAL MOTORS	102	0.99	0.87	16.83	22.47	2.76	1.19	13.75	2.44	19.42	3.37
FORD	99	0.99	0.58	9.26	10.97	2.73	1.11	13.32	2.50	18.77	3.44
CHRYSLER	99	1.99	1.08	34.79	25.29	2.98	1.38	14.05	2.60	20.26	2.89
TOTAL	300	1.32	0.99	20.26	23.10	2.82	1.23	13.70	2.53	19.46	3.32

*NO_x CORRECTED FOR HUMIDITY

TABLE B-3

MEAN BAG EMISSION LEVELS
BY CITY FOR TEST SEQUENCE 1

CITY	# CARS	HYDROCARBONS (gm)		CARBON MONOXIDE (gm)		NO_X* (gm)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
CHICAGO	100	7.53	5.71	113.17	122.14	12.62	5.98
DETROIT	100	7.49	4.22	99.91	97.43	11.35	4.32
WASHINGTON	100	8.19	4.29	127.05	92.78	13.24	5.53
TOTAL	300	7.74	4.79	113.38	105.17	12.40	5.36
COLD STABILIZED DATA							
CHICAGO	100	4.05	4.20	73.36	100.46	8.98	4.74
DETROIT	100	4.57	4.76	79.52	117.44	8.10	3.16
WASHINGTON	100	4.12	4.34	79.67	114.37	10.06	4.81
TOTAL	300	4.25	4.43	77.52	110.67	9.05	4.36
HOT TRANSIENT DATA							
CHICAGO	100	3.86	2.71	45.61	57.00	12.40	6.05
DETROIT	100	4.23	2.94	43.40	50.77	10.84	3.98
WASHINGTON	100	4.16	2.62	46.06	53.32	12.52	5.76
TOTAL	300	4.08	2.76	45.02	53.59	11.92	5.38

*NO_X CORRECTED FOR HUMIDITY

TABLE B-4

MEAN BAG EMISSION LEVELS
BY MANUFACTURER FOR TEST SEQUENCE 1

MANUFACTURER	# CARS	HYDROCARBONS (gm) ARITHMETIC MEAN	HYDROCARBONS (gm) ARITHMETIC S.D.	CARBON MONOXIDE (gm) ARITHMETIC MEAN	CARBON MONOXIDE (gm) ARITHMETIC S.D.	NO_X* (gm) ARITHMETIC MEAN	NO_X* (gm) ARITHMETIC S.D.
COLD TRANSIENT DATA							
GM	102	6.86	2.93	102.23	92.15	12.87	5.05
FORD	99	5.78	2.96	67.17	51.62	10.75	4.81
CHRYSLER	99	10.60	6.27	171.06	129.10	13.57	5.82
TOTAL	300	7.74	4.79	113.38	105.17	12.40	5.36
COLD STABILIZED DATA							
GM	102	2.88	4.38	61.12	111.18	8.45	4.12
FORD	99	2.88	2.50	27.60	51.61	9.59	4.03
CHRYSLER	99	7.02	4.72	144.33	121.03	9.13	4.86
TOTAL	300	4.25	4.43	77.52	110.67	9.05	4.36
HOT TRANSIENT DATA							
GM	102	2.86	2.45	37.15	47.45	11.80	5.20
FORD	99	3.53	1.70	22.70	24.30	11.02	4.77
CHRYSLER	99	5.90	2.99	75.46	65.93	12.95	5.97
TOTAL	300	4.08	2.76	45.02	53.59	11.92	5.38

***NO_X CORRECTED FOR HUMIDITY**

TABLE B-5

MEAN FEDERAL TEST PROCEDURE (FTP) EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMY BY CITY FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2

CITY	# CARS	HYDROCARBONS (gm/mi)		CARBON MONOXIDE (gm/mi)		NO_x* (gm/mi)		URBAN FUEL ECONOMY (mi/gal)		HIGHWAY FUEL ECONOMY (mi/gal)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC		HARMONIC		HARMONIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
CHICAGO	35	1.08	0,72	11.76	10.24	2,82	0,62	13.81	2.48	19.16	2,95
DETROIT	40	1.57	1.13	26.48	26.88	2.47	0.77	13.52	0.93	19.55	2.78
WASHINGTON	38	1.77	1.10	30.28	28.17	2.92	0.87	13.25	2.06	19.45	2.98
TOTAL	113	1.48	1.04	23.20	24.64	2.72	0.78	12.06	1.78	19.39	2.88

*NO_x CORRECTED FOR HUMIDITY

TABLE B-6

MEAN FEDERAL TEST PROCEDURE (FTP) EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMY BY MANUFACTURER FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2

MANUFACTURER	# CARS	HYDROCARBONS (gm/mi)		CARBON MONOXIDE (gm/mi)		NO_x* (gm/mi)		URBAN FUEL ECONOMY (mi/gal)		HIGHWAY FUEL ECONOMY (mi/gal)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC		HARMONIC		HARMONIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
GENERAL MOTORS	36	1.21	0.98	21.67	25.79	2.63	0.74	13.37	1.43	19.13	2.58
FORD	30	1.13	0.64	10.26	13.19	3.00	1.11	13.65	1.89	19.01	3.20
CHRYSLER	47	1.92	1.14	32.63	25.71	2.60	0.48	13.55	2.23	19.86	2.88
TOTAL	113	1.48	1.04	23.20	24.64	2.72	0.78	12.06	1.78	19.39	2.88

*NO_x CORRECTED FOR HUMIDITY

TABLE B-7
MEAN BAG EMISSION LEVELS BY CITY FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2

CITY	# CARS	HYDROCARBONS (gm)		CARBON MONOXIDE (gm)		NO_X* (gm)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
CHICAGO	35	6.85	3.45	87.77	45.74	12.97	3.72
DETROIT	40	7.94	3.92	128.46	162.82	10.91	3.43
WASHINGTON	38	10.46	6.48	155.24	106.11	12.39	3.24
TOTAL	113	8.45	5.01	124.86	119.72	12.05	3.54
COLD STABILIZED DATA							
CHICAGO	35	3.12	3.06	35.03	51.29	8.59	2.27
DETROIT	40	5.78	5.49	112.63	123.67	7.47	2.80
WASHINGTON	38	5.79	4.68	122.93	136.71	9.71	3.63
TOTAL	113	4.96	4.70	92.06	117.43	8.57	3.09
HOT TRANSIENT DATA							
CHICAGO	35	3.58	2.16	27.07	23.08	12.28	2.92
DETROIT	40	4.52	3.22	53.95	47.79	10.87	3.63
WASHINGTON	38	5.19	2.87	65.70	63.67	12.00	3.51
TOTAL	113	4.45	2.86	49.57	50.49	11.68	3.41

*NO_X CORRECTED FOR HUMIDITY

TABLE B-8

MEAN BAG EMISSION LEVELS BY CITY FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2

MANUFACTURER	# CARS	HYDROCARBONS (gm)		CARBON MONOXIDE (gm)		NO_X* (gm)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
GM	36	7.71	3.74	122.02	165.21	12.82	3.57
FORD	30	6.41	4.16	67.46	65.52	11.63	4.54
CHRYSLER	47	10.31	5.73	163.67	87.92	11.72	2.66
TOTAL	113	8.45	5.01	124.86	119.72	12.05	3.54
COLD STABILIZED DATA							
GM	36	3.94	4.89	85.08	116.14	7.77	2.72
FORD	30	3.54	2.56	34.72	63.29	10.50	4.11
CHRYSLER	47	6.65	5.15	134.00	129.63	7.94	1.89
TOTAL	113	4.96	4.70	92.06	117.43	8.57	3.09
HOT TRANSIENT DATA							
GM	36	3.20	2.45	43.84	42.20	11.45	3.14
FORD	30	3.81	1.47	23.26	22.22	12.34	4.76
CHRYSLER	47	5.83	3.24	70.76	60.04	11.44	2.47
TOTAL	113	4.45	2.86	49.57	50.49	11.68	3.41

***NO_X CORRECTED FOR HUMIDITY**

TABLE B-9

MEAN FEDERAL TEST PROCEDURE (FTP) EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMY BY CITY FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3

		HYDROCARBONS (gm/mi)		CARBON MONOXIDE (gm/mi)		NO_x* (gm/mi)		URBAN FUEL ECONOMY (mi/gal)		HIGHWAY FUEL ECONOMY (mi/gal)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC		HARMONIC		HARMONIC	
CITY	# CARS	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
CHICAGO	42	1.01	0.73	11.27	16.11	2.67	0.69	14.05	2.67	19.12	3.34
DETROIT	41	1.03	0.58	8.51	8.63	2.76	0.86	14.82	20.51	2.48	2.60
WASHINGTON	60	1.10	0.80	10.74	8.23	3.33	1.87	13.61	2.25	19.48	2.81
TOTAL	143	1.05	0.71	10.26	11.20	2.97	1.38	14.07	2.47	19.65	2.98

*NO_x CORRECTED FOR HUMIDITY

TABLE B-10

MEAN FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMY
BY MANUFACTURER FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3

MANUFACTURER	# CARS	HYDROCARBONS (gm/mi)		CARBON MONOXIDE (gm/mi)		NO_x* (gm/mi)		URBAN FUEL ECONOMY (mi/gal)		HIGHWAY FUEL ECONOMY (mi/gal)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC		HARMONIC		HARMONIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
GENERAL MOTORS	42	0.65	0.38	8.26	9.00	2.72	0.73	14.16	2.47	19.54	3.29
FORD	32	1.16	0.49	7.73	5.85	3.88	2.22	13.11	1.75	18.31	2.30
CHRYSLER	69	1.25	0.85	12.64	13.64	2.71	0.95	14.51	2.74	20.42	2.90
TOTAL	143	1.05	0.71	10.26	11.20	2.97	1.38	14.07	2.47	19.65	2.98

*NO_x CORRECTED FOR HUMIDITY

TABLE B-11

MEAN BAG VALUE EMISSION LEVELS BY CITY FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3

CITY	# CARS	HYDROCARBONS (gm) ARITHMETIC MEAN	HYDROCARBONS (gm) ARITHMETIC S.D.	CARBON MONOXIDE (gm) ARITHMETIC MEAN	CARBON MONOXIDE (gm) ARITHMETIC S.D.	NO_X* (gm) ARITHMETIC MEAN	NO_X* (gm) ARITHMETIC S.D.
COLD TRANSIENT DATA							
CHICAGO	42	7.60	5.20	102.06	107.94	12.48	4.02
DETROIT	41	7.22	4.67	84.02	73.48	12.08	3.71
WASHINGTON	60	8.60	7.36	122.66	98.05	14.25	7.30
TOTAL	143	7.91	6.07	105.53	95.61	13.11	5.63
COLD STABILIZED DATA							
CHICAGO	42	2.44	2.52	23.20	43.97	8.07	2.36
DETROIT	41	2.73	2.01	18.41	32.26	8.89	3.39
WASHINGTON	60	2.43	2.62	15.43	18.57	10.99	6.62
TOTAL	143	2.52	2.42	18.57	31.70	9.53	4.97
HOT TRANSIENT DATA							
CHICAGO	42	3.30	2.32	30.54	61.58	11.56	2.96
DETROIT	41	3.26	1.96	16.37	17.63	11.59	3.52
WASHINGTON	60	3.78	2.71	21.77	19.44	13.83	8.08
TOTAL	143	3.49	2.40	22.80	37.01	12.52	5.86

*NO_X CORRECTED FOR HUMIDITY

TABLE B-12

MEAN BAG VALUE EMISSION LEVELS BY CITY FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3

MANUFACTURER	# CARS	HYDROCARBONS (gm)		CARBON MONOXIDE (gm)		NO_X* (gm)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
GM	42	6.49	3.23	86.49	74.14	12.82	3.67
FORD	32	6.11	2.87	73.72	59.47	15.39	8.78
CHRYSLER	69	9.61	7.81	131.87	112.95	12.23	4.42
TOTAL	143	7.91	6.07	105.53	95.61	13.11	5.63
COLD STABILIZED DATA							
GM	42	0.99	1.21	14.83	29.87	8.20	2.56
FORD	32	3.43	1.66	15.94	18.33	13.50	7.40
CHRYSLER	69	3.05	2.82	22.06	37.19	8.49	3.61
TOTAL	143	2.52	2.42	18.57	31.70	9.53	4.97
HOT TRANSIENT DATA							
GM	42	1.91	1.09	17.48	16.49	11.68	3.26
FORD	32	4.62	2.73	18.14	12.57	15.74	9.94
CHRYSLER	69	3.93	2.36	28.20	50.66	11.54	3.75
TOTAL	143	3.49	2.40	22.80	37.01	12.52	5.86

*NO_X CORRECTED FOR HUMIDITY

TABLE B-13

FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMY BY CITY FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4

CITY	# CARS	HYDROCARBONS (gm/mi) ARITHMETIC		CARBON MONOXIDE (gm/mi) ARITHMETIC		NO_x* (gm/mi) ARITHMETIC		URBAN FUEL ECONOMY (mi/gal) HARMONIC		HIGHWAY FUEL ECONOMY (mi/gal) HARMONIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
CHICAGO	24	1.16	0.82	12.73	16.41	2.78	0.74	14.57	3.01	19.92	3.85
DETROIT	17	1.28	0.49	10.70	12.45	2.95	0.88	13.28	0.40	19.33	2.19
WASHINGTON	42	1.14	0.77	10.37	7.88	3.17	0.93	12.96	1.90	18.60	2.21
TOTAL	83	1.17	0.73	11.12	11.74	3.01	0.88	13.58	2.34	19.11	2.73

*NO_x CORRECTED FOR HUMIDITY

TABLE B-14

FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS AND URBAN AND HIGHWAY FUEL ECONOMY
BY MANUFACTURER FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4

MANUFACTURER	**# CARS**	**HYDROCARBONS (gm/mi)**		**CARBON MONOXIDE (gm/mi)**		**NO_x* (gm/mi)**		**URBAN FUEL ECONOMY (mi/gal)**		**HIGHWAY FUEL ECONOMY (mi/gal)**	
		ARITHMETIC		**ARITHMETIC**		**ARITHMETIC**		**HARMONIC**		**HARMONIC**	
		MEAN	**S.D.**	**MEAN**	**S.D.**	**MEAN**	**S.D.**	**MEAN**	**S.D.**	**MEAN**	**S.D.**
GENERAL MOTORS	17	0.69	0.38	11.04	12.13	3.11	0.91	13.41	2.45	18.87	3.28
FORD	30	1.14	0.38	7.04	3.97	3.44	0.86	13.16	1.77	18.47	2.54
CHRYSLER	36	1.43	0.95	14.56	14.71	2.61	0.69	13.73	2.24	19.79	2.47
TOTAL	83	1.17	0.73	11.12	11.74	3.01	0.88	13.58	2.34	19.11	2.73

***NO_x CORRECTED FOR HUMIDITY**

TABLE B-15

MEAN BAG VALUE EMISSION LEVELS BY CITY FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4

CITY	# CARS	HYDROCARBONS (gm)		CARBON MONOXIDE (gm)		NO_X* (gm)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
CHICAGO	24	7.63	5.58	107.41	121.59	12.82	4.21
DETROIT	17	7.30	2.74	81.81	55.68	12.10	3.97
WASHINGTON	42	9.23	7.59	120.94	102.33	13.33	4.27
TOTAL	83	8.37	6.30	109.02	101.07	12.93	4.17
COLD STABILIZED DATA							
CHICAGO	24	3.14	2.76	28.73	40.01	8.48	2.70
DETROIT	17	4.02	1.97	30.91	55.58	10.10	3.58
WASHINGTON	42	2.40	2.32	13.42	13.74	10.54	3.65
TOTAL	83	2.95	2.45	21.43	34.83	9.86	3.46
HOT TRANSIENT DATA							
CHICAGO	24	3.97	2.70	36.13	61.25	12.02	3.21
DETROIT	17	4.27	1.60	24.80	28.08	11.95	3.13
WASHINGTON	42	3.83	1.76	21.71	18.82	13.21	4.00
TOTAL	83	3.96	2.03	26.51	37.72	12.61	3.63

*NO_X CORRECTED FOR HUMIDITY

TABLE B-16

MEAN BAG VALUE EMISSION LEVELS BY MANUFACTURER FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4

MANUFACTURER	# CARS	HYDROCARBONS (gm) ARITHMETIC MEAN	HYDROCARBONS (gm) ARITHMETIC S.D.	CARBON MONOXIDE (gm) ARITHMETIC MEAN	CARBON MONOXIDE (gm) ARITHMETIC S.D.	NO_X* (gm) ARITHMETIC MEAN	NO_X* (gm) ARITHMETIC S.D.
COLD TRANSIENT DATA							
GM	17	6.30	2.26	100.51	60.67	14.29	4.47
FORD	30	6.61	3.46	69.19	48.91	13.03	3.85
CHRYSLER	36	10.82	8.36	146.22	132.09	12.20	4.22
TOTAL	83	8.37	6.30	109.02	101.07	12.93	4.17
COLD STABILIZED DATA							
GM	17	1.22	1.57	25.75	54.56	9.50	3.05
FORD	30	3.35	1.56	13.36	14.30	12.30	3.38
CHRYSLER	36	3.42	3.01	26.11	35.00	7.99	2.37
TOTAL	83	2.95	2.45	21.43	34.83	9.86	3.46
HOT TRANSIENT DATA							
GM	17	2.23	1.07	24.23	28.41	13.50	4.02
FORD	30	4.17	1.28	17.06	9.57	13.83	3.64
CHRYSLER	36	4.59	2.43	35.47	52.21	11.17	2.96
TOTAL	83	3.96	2.03	26.51	37.72	12.61	3.63

*NO_X CORRECTED FOR HUMIDITY

TABLE B-17

MEAN EMISSIONS AND FUEL ECONOMY BY MANUFACTURER AND TEST SEQUENCE*

	TOTAL N	1st Test	2nd Test	3rd Test	4th Test
MEAN HC 1975 FTP EMISSIONS					
GM	102	1.00	0.95	0.81	0.60
FORD	99	0.98	0.98	0.91	0.90
CHRY	99	1.99	1.88	1.18	1.11
TOTAL	300	1.32	1.25	0.90	0.87
MEAN CO 1975 FTP EMISSIONS					
GM	102	16.87	15.51	7.05	6.88
FORD	99	9.26	8.48	5.80	5.48
CHRY	99	34.79	31.45	11.58	10.60
TOTAL	300	20.27	18.44	8.13	7.65
MEAN NOX 1975 FTP EMISSIONS					
GM	102	2.76	2.57	2.52	2.51
FORD	99	2.73	2.75	2.88	2.58
CHRY	99	2.98	2.63	2.68	2.58
TOTAL	300	2.82	2.65	2.69	2.55
MEAN FUEL ECONOMY IN MPG					
GM	102	13.76	13.80	14.00	13.98
FORD	99	13.31	13.41	13.51	13.49
CHRY	99	14.16	14.03	14.48	14.39
TOTAL	300	13.74	13.75	13.98	13.95

*Test 1: As-received
Test 2: After correction of maladjustment and disablement (except idle CO and RPM adjustment)
Test 3: After idle CO and RPM are reset to specifications
Test 4: After emission control component repair and major tune-up

TABLE B-18

MEAN EMISSIONS AND FUEL ECONOMY BY SITE AND TEST SEQUENCE*

MEAN HC 1975 FTP EMISSIONS

	TOTAL N	1st Test	2nd Test	3rd Test	4th Test
DETR	100	1.36	1.31	0.89	0.86
WASH	100	1.34	1.34	0.96	0.89
CHIC	100	1.27	1.11	0.85	0.85
TOTAL	300	1.32	1.25	0.90	0.87

MEAN CO 1975 FTP EMISSIONS

DETR	100	19.63	18.38	7.10	6.58
WASH	100	21.44	21.29	9.01	8.38
CHIC	100	19.74	15.67	8.29	8.00
TOTAL	300	20.27	18.44	8.13	7.65

MEAN NOX 1975 FTP EMISSIONS

DETR	100	2.55	2.45	2.46	2.42
WASH	100	3.05	2.91	3.05	2.73
CHIC	100	2.86	2.58	2.57	2.51
TOTAL	300	2.82	2.65	2.69	2.55

MEAN FUEL ECONOMY IN MPG

DETR	100	13.86	13.95	14.24	14.20
WASH	100	13.51	13.45	13.73	13.67
CHIC	100	13.85	13.85	13.99	13.98
TOTAL	300	13.74	13.75	13.98	13.95

*Test 1: As-received
Test 2: After correction of maladjustment and disablement (except idle CO and RPM adjustment)
Test 3: After idle CO and RPM are reset to specifications
Test 4: After emission control component repair and major tune-up

TABLE B-19 FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS EXTRAPOLATED TO
50,000 MILES BY MANUFACTURER FOR TEST SEQUENCE 1

MANUFACTURER	# CARS	HYDROCARBONS (gm/mi) ARITHMETIC MEAN	HYDROCARBONS (gm/mi) ARITHMETIC S.D.	CARBON MONOXIDE (gm/mi) ARITHMETIC MEAN	CARBON MONOXIDE (gm/mi) ARITHMETIC S.D.	NO_x* (gm/mi) ARITHMETIC MEAN	NO_x* (gm/mi) ARITHMETIC S.D.
GENERAL MOTORS	102	1.47	1.30	19.57	24.85	3.06	1.23
FORD	99	1.31	0.69	11.48	13.66	2.88	1.17
CHRYSLER	99	2.35	1.18	38.02	26.47	3.18	1.46
TOTAL	300	1.71	1.18	22.99	24.94	3.04	1.29

*NO_x CORRECTED FOR HUMIDITY

TABLE B-20 FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS EXTRAPOLATED TO
TO 50,000 MILES BY CITY FOR TEST SEQUENCE 1

CITY	# CARS	HYDROCARBONS (gm/mi) ARITHMETIC MEAN	HYDROCARBONS (gm/mi) ARITHMETIC S.D.	CARBON MONOXIDE (gm/mi) ARITHMETIC MEAN	CARBON MONOXIDE (gm/mi) ARITHMETIC S.D.	NO_x* (gm/mi) ARITHMETIC MEAN	NO_x* (gm/mi) ARITHMETIC S.D.
CHICAGO	100	1.64	1.14	22.64	23.93	3.08	1.47
DETROIT	100	1.74	1.23	22.21	25.40	2.74	0.93
WASHINGTON	100	1.74	1.17	24.12	25.67	3.30	1.37
TOTAL	300	1.71	1.18	22.99	24.94	3.04	1.29

*NO_x CORRECTED FOR HUMIDITY

TABLE B-21 BAG VALUE EMISSIONS LEVELS
EXTRAPOLATED TO 50,000 MILES BY CITY FOR TEST SEQUENCE 1

CITY	# CARS	HYDROCARBONS (gm)		CARBON MONOXIDE (gm)		NO_X* (gm)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
CHICAGO	100	9.85	6.37	129.66	124.15	13.60	6.40
DETROIT	100	9.72	4.55	113.73	99.97	12.18	4.43
WASHINGTON	100	10.77	5.51	144.80	110.11	14.34	5.76
TOTAL	300	10.11	5.53	129.40	112.20	13.37	5.64
COLD STABILIZED DATA							
CHICAGO	100	5.17	4.98	83.69	110.80	9.66	5.07
DETROIT	100	5.79	6.00	89.37	126.79	8.67	3.22
WASHINGTON	100	5.24	5.41	89.08	126.04	10.83	4.88
TOTAL	300	5.40	5.47	87.38	121.06	9.72	4.54
HOT TRANSIENT DATA							
CHICAGO	100	5.01	3.08	53.22	61.00	13.37	6.51
DETROIT	100	5.43	3.56	49.64	53.98	11.68	4.32
WASHINGTON	100	5.41	3.27	51.90	58.08	13.56	5.99
TOTAL	300	5.28	3.30	51.59	57.59	12.87	5.73

*NO_X CORRECTED FOR HUMIDITY

TABLE B-22 BAG VALUE EMISSIONS LEVELS

EXTRAPOLATED TO 50,000 MILES BY MANUFACTURER FOR TEST SEQUENCE 1

MANUFACTURER	# CARS	HYDROCARBONS (gm) ARITHMETIC MEAN	HYDROCARBONS (gm) ARITHMETIC S.D.	CARBON MONOXIDE (gm) ARITHMETIC MEAN	CARBON MONOXIDE (gm) ARITHMETIC S.D.	NO_X* (gm) ARITHMETIC MEAN	NO_X* (gm) ARITHMETIC S.D.
COLD TRANSIENT DATA							
GM	102	10.18	4.32	117.45	96.18	14.30	5.26
FORD	99	7.63	3.64	83.41	65.14	11.32	5.05
CHRYSLER	99	12.53	6.97	187.69	137.53	14.47	6.06
TOTAL	300	10.11	5.53	129.40	112.20	13.37	5.64
COLD STABILIZED DATA							
GM	102	4.25	6.41	71.37	125.15	9.32	4.25
FORD	99	3.75	2.96	33.90	63.85	10.10	4.20
CHRYSLER	99	8.24	5.27	157.35	128.03	9.74	5.13
TOTAL	300	5.40	5.47	87.38	121.06	9.72	4.54
HOT TRANSIENT DATA							
GM	102	4.24	3.60	43.69	53.00	13.08	5.40
FORD	99	4.67	2.07	28.66	30.01	11.62	5.07
CHRYSLER	99	6.97	3.35	82.65	68.93	13.90	6.46
TOTAL	300	5.28	3.30	51.59	57.59	12.87	5.73

*NO_X CORRECTED FOR HUMIDITY

TABLE B-23

FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES
BY CITY FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2

CITY	# CARS	HYDROCARBONS (gm/mi)		CARBON MONOXIDE (gm/mi)		NO_x* (gm/mi)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
CHICAGO	35	1.39	0.80	13.47	11.90	2.97	0.66
DETROIT	40	1.69	1.18	27.48	27.19	2.56	0.84
WASHINGTON	38	2.27	1.32	33.80	31.25	3.17	0.89
TOTAL	113	1.79	1.18	25.26	26.32	2.89	0.84

*NO_x CORRECTED FOR HUMIDITY

TABLE B-24

FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES
BY MANUFACTURER FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2

MANUFACTURER	# CARS	HYDROCARBONS (gm/mi)		CARBON MONOXIDE (gm/mi)		NO_x* (gm/mi)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
GENERAL MOTORS	36	1.53	1.08	23.09	26.67	2.78	0.82
FORD	30	1.34	0.75	11.41	15.12	3.12	1.16
CHRYSLER	47	2.28	1.30	35.77	27.57	2.81	0.54
TOTAL	113	1.79	1.18	25.26	26.32	2.89	0.84

*NO_x CORRECTED FOR HUMIDITY

TABLE B-25

BAG VALUE EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES BY CITY FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2

CITY	# CARS	HYDROCARBONS (gm)		CARBON MONOXIDE (gm)		NO_X* (gm)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
CHICAGO	35	8.96	3.96	100.53	49.16	13.64	3.96
DETROIT	40	8.52	3.98	132.89	162.65	11.37	3.63
WASHINGTON	38	13.44	7.32	173.06	118.05	13.46	3.42
TOTAL	113	10.31	5.74	136.38	124.14	12.78	3.79
COLD STABILIZED DATA							
CHICAGO	35	3.95	3.63	39.80	59.94	9.04	2.38
DETROIT	40	6.21	5.68	116.85	125.96	7.78	2.96
WASHINGTON	38	7.41	5.74	137.28	151.43	10.51	3.71
TOTAL	113	5.91	5.30	99.86	126.08	9.09	3.26
HOT TRANSIENT DATA							
CHICAGO	35	4.57	2.38	31.54	27.28	12.96	3.17
DETROIT	40	4.93	3.54	56.28	49.04	11.41	4.16
WASHINGTON	38	6.73	3.59	73.34	71.18	13.05	3.66
TOTAL	113	5.42	3.35	54.35	54.99	12.44	3.75

*NO_X CORRECTED FOR HUMIDITY

TABLE B-26

BAG VALUE EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES BY MANUFACTURER FOR THE 113 VEHICLES THAT RECEIVED TEST SEQUENCE 2

MANUFACTURER	# CARS	HYDROCARBONS (gm)		CARBON MONOXIDE (gm)		NO_X* (gm)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
GM	36	10.10	4.75	130.93	165.14	13.54	4.08
FORD	30	7.66	5.17	76.62	83.30	12.07	4.68
CHRYSLER	47	12.17	6.18	178.68	90.67	12.65	2.77
TOTAL	113	10.31	5.74	136.38	124.14	12.78	3.79
COLD STABILIZED DATA							
GM	36	4.81	5.33	90.15	122.54	8.23	3.00
FORD	30	4.16	2.84	37.73	69.79	10.93	4.32
CHRYSLER	47	7.88	5.91	146.94	139.10	8.58	2.05
TOTAL	113	5.91	5.30	99.86	126.08	9.09	3.26
HOT TRANSIENT DATA							
GM	36	4.10	2.88	46.94	44.54	12.09	3.45
FORD	30	4.61	1.80	26.11	24.72	12.84	4.99
CHRYSLER	47	6.96	3.84	78.05	65.80	12.43	3.05
TOTAL	113	5.42	3.35	54.35	54.99	12.44	3.75

*NO_X CORRECTED FOR HUMIDITY

TABLE B-27

FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES
BY CITY FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3

CITY	# CARS	HYDROCARBONS (gm/mi) ARITHMETIC MEAN	HYDROCARBONS (gm/mi) ARITHMETIC S.D.	CARBON MONOXIDE (gm/mi) ARITHMETIC MEAN	CARBON MONOXIDE (gm/mi) ARITHMETIC S.D.	NO_x* (gm/mi) ARITHMETIC MEAN	NO_x* (gm/mi) ARITHMETIC S.D.
CHICAGO	42	1.26	0.72	12.75	16.11	2.84	0.71
DETROIT	41	1.10	0.60	8.91	8.72	2,86	0.87
WASHINGTON	60	1.38	0.82	11.72	8.58	3.61	1.93
TOTAL	143	1.27	0.74	11.22	11.37	3.17	1.43

*NO_x CORRECTED FOR HUMIDITY

TABLE B-28

FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES BY MANUFACTURER FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3

MANUFACTURER	# CARS	HYDROCARBONS (gm/mi) ARITHMETIC MEAN	HYDROCARBONS (gm/mi) ARITHMETIC S.D.	CARBON MONOXIDE (gm/mi) ARITHMETIC MEAN	CARBON MONOXIDE (gm/mi) ARITHMETIC S.D.	NO_x* (gm/mi) ARITHMETIC MEAN	NO_x* (gm/mi) ARITHMETIC S.D.
GENERAL MOTORS	42	0.86	0.43	8.93	8.92	2.92	0.78
FORD	32	1.39	0.56	8.88	7.17	4.01	2.34
CHRYSLER	69	1.46	0.86	13.70	13.66	2.93	0.99
TOTAL	143	1.27	0.74	11.22	11.37	3.17	1.43

*NO_x CORRECTED FOR HUMIDITY

TABLE B-29

BAG VALUE EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES BY CITY FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3

CITY	# CARS	HYDROCARBONS (gm)		CARBON MONOXIDE (gm)		NO_X* (gm)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
CHICAGO	42	13.26	4.08	115.88	107.87	9.76	5.66
DETROIT	41	7.72	4.62	86.73	72.58	12.50	3.74
WASHINGTON	60	10.82	7.46	133.88	101.09	15.47	7.58
TOTAL	143	9.62	6.33	115.07	97.32	13.97	5.86
COLD STABILIZED DATA							
CHICAGO	42	8.59	2.42	25.86	44.64	2.94	2.61
DETROIT	41	2.95	2.17	19.61	33.33	9.19	3.36
WASHINGTON	60	2.96	3.07	16.63	19.34	11.87	6.78
TOTAL	143	2.95	2.68	20.19	32.53	10.14	5.12
HOT TRANSIENT DATA							
CHICAGO	42	12.34	3.25	35.03	61.92	4.13	2.35
DETROIT	41	3.52	2.10	17.47	18.41	12.06	3.76
WASHINGTON	60	4.79	3.22	24.10	22.06	15.02	8.40
TOTAL	143	4.23	2.72	25.41	38.09	13.38	6.19

*NO_X CORRECTED FOR HUMIDITY

TABLE B-30

BAG VALUE EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES BY MANUFACTURER FOR THE 143 VEHICLES THAT RECEIVED TEST SEQUENCE 3

MANUFACTURER	# CARS	HYDROCARBONS (gm) ARITHMETIC		CARBON MONOXIDE (gm) ARITHMETIC		NO_X* (gm) ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
GM	42	8.72	4.04	93.82	71.13	13.76	3.85
FORD	32	7.34	3.55	84.27	74.24	15.94	9.31
CHRYSLER	69	11.23	7.90	142.30	112.09	13.18	4.56
TOTAL	143	9.62	6.33	115.07	97.32	13.97	5.86
COLD STABILIZED DATA							
GM	42	1.25	1.23	15.60	29.92	8.83	2.77
FORD	32	4.05	1.79	18.07	20.39	13.95	7.77
CHRYSLER	69	3.48	3.16	23.98	38.09	9.16	3.71
TOTAL	143	2.95	2.68	20.19	32.53	10.14	5.12
HOT TRANSIENT DATA							
GM	42	2.61	1.57	19.36	17.22	12.57	3.46
FORD	32	5.61	3.45	21.60	16.93	16.30	10.52
CHRYSLER	69	4.58	2.44	30.86	51.59	12.53	4.15
TOTAL	143	4.23	2.72	25.41	38.09	13.38	6.19

*NO_X CORRECTED FOR HUMIDITY

TABLE B-31

FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES
BY CITY FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4

CITY	# CARS	HYDROCARBONS (gm/mi) ARITHMETIC MEAN	HYDROCARBONS (gm/mi) ARITHMETIC S.D.	CARBON MONOXIDE (gm/mi) ARITHMETIC MEAN	CARBON MONOXIDE (gm/mi) ARITHMETIC S.D.	NO_x* (gm/mi) ARITHMETIC MEAN	NO_x* (gm/mi) ARITHMETIC S.D.
CHICAGO	24	1.39	0.79	14.36	16.22	2.92	0.74
DETROIT	17	1.35	0.48	10.95	12.35	3.04	0.92
WASHINGTON	42	1.37	0.76	11.47	8.41	3.40	0.96
TOTAL	83	1.38	0.71	12.20	11.87	3.19	0.91

*NO_x CORRECTED FOR HUMIDITY

TABLE B-32

FEDERAL TEST PROCEDURE (FTP)
EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES
BY MANUFACTURER FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4

MANUFACTURER	# CARS	HYDROCARBONS (gm/mi) ARITHMETIC MEAN	HYDROCARBONS (gm/mi) ARITHMETIC S.D.	CARBON MONOXIDE (gm/mi) ARITHMETIC MEAN	CARBON MONOXIDE (gm/mi) ARITHMETIC S.D.	NO_x* (gm/mi) ARITHMETIC MEAN	NO_x* (gm/mi) ARITHMETIC S.D.
GENERAL MOTORS	17	0.94	0.35	11.64	12.00	3.34	1.02
FORD	30	1.35	0.43	8.47	5.28	3.56	0.84
CHRYSLER	36	1.60	0.91	15.57	14.75	2.81	0.77
TOTAL	83	1.38	0.71	12.20	11.87	3.19	0.91

*NO_x CORRECTED FOR HUMIDITY

TABLE B-33

BAG VALUE EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES BY CITY FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4

CITY	# CARS	HYDROCARBONS (gm)		CARBON MONOXIDE (gm)		NO_X* (gm)	
		ARITHMETIC		ARITHMETIC		ARITHMETIC	
		MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
COLD TRANSIENT DATA							
CHICAGO	24	9.27	5.44	121.74	119.34	13.45	4.23
DETROIT	17	7.72	2.60	83.90	54.69	12.47	4.17
WASHINGTON	42	11.18	7.77	133.29	108.16	14.33	4.77
TOTAL	83	9.92	6.46	119.83	103.87	13.70	4.51
COLD STABILIZED DATA							
CHICAGO	24	3.72	2.83	32.19	40.52	8.92	2.76
DETROIT	17	4.22	1.98	31.35	55.44	10.37	3.58
WASHINGTON	42	2.82	2.37	14.68	14.46	11.25	3.65
TOTAL	83	3.37	2.48	23.16	35.21	10.40	3.51
HOT TRANSIENT DATA							
CHICAGO	24	4.82	2.58	40.67	60.87	12.68	3.39
DETROIT	17	4.55	1.76	25.82	28.15	12.37	3.63
WASHINGTON	42	4.71	2.00	24.63	22.96	14.14	4.17
TOTAL	83	4.71	2.11	29.51	38.84	13.35	3.89

*NO_X CORRECTED FOR HUMIDITY

TABLE B-34

BAG VALUE EMISSIONS LEVELS EXTRAPOLATED TO 50,000 MILES BY MANUFACTURER FOR THE 83 VEHICLES THAT RECEIVED TEST SEQUENCE 4

MANUFACTURER	# CARS	HYDROCARBONS (gm) ARITHMETIC MEAN	HYDROCARBONS (gm) ARITHMETIC S.D.	CARBON MONOXIDE (gm) ARITHMETIC MEAN	CARBON MONOXIDE (gm) ARITHMETIC S.D.	NO_X* (gm) ARITHMETIC MEAN	NO_X* (gm) ARITHMETIC S.D.
COLD TRANSIENT DATA							
GM	17	8.72	2.70	107.15	60.60	15.38	5.18
FORD	30	7.94	4.49	83.96	66.64	13.46	3.82
CHRYSLER	36	12.14	8.28	155.72	131.95	13.10	4.63
TOTAL	83	9.92	6.46	119.83	103.87	13.70	4.51
COLD STABILIZED DATA							
GM	17	1.50	1.50	26.65	54.58	10.17	3.31
FORD	30	3.89	1.66	15.55	16.81	12.72	3.34
CHRYSLER	36	3.82	2.99	27.85	35.07	8.57	2.55
TOTAL	83	3.37	2.48	23.16	35.21	10.40	3.51
HOT TRANSIENT DATA							
GM	17	3.09	1.27	25.57	28.80	14.49	4.52
FORD	30	4.96	1.61	20.86	13.46	14.30	3.62
CHRYSLER	36	5.26	2.44	38.58	53.38	12.03	3.47
TOTAL	83	4.71	2.11	29.51	38.84	13.35	3.89

*NO_X CORRECTED FOR HUMIDITY

TABLE B-35 HISTORY OF ALL TESTS TAKEN BY EACH OF 300 VEHICLES

OBS	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	VEHNUM	CITY	MANUFACT
1	P										001	CHICAGO	CHRYSLER
2	P										002	CHICAGO	CHRYSLER
3	T		T	T		T					003	CHICAGO	CHRYSLER
4	T	T	T	P	T	T	P	T	T		004	CHICAGO	CHRYSLER
5	T	T	T	T							005	CHICAGO	CHRYSLER
6	T		P								006	CHICAGO	CHRYSLER
7	T	P									007	CHICAGO	CHRYSLER
8	P										008	CHICAGO	CHRYSLER
9	T	T	P								009	CHICAGO	CHRYSLER
10	T	T	T	T							010	CHICAGO	CHRYSLER
11	T	T	P								011	CHICAGO	CHRYSLER
12	P										012	CHICAGO	CHRYSLER
13	T		P		T	T	T	T	P	P	013	CHICAGO	CHRYSLER
14	T	T	P			T	T	T	T	T	014	CHICAGO	CHRYSLER
15	T		P								015	CHICAGO	CHRYSLER
16	T	P									016	CHICAGO	CHRYSLER
17	T	T	P								017	CHICAGO	CHRYSLER
18	T		T	P							018	CHICAGO	CHRYSLER
19	T		T	P	T						019	CHICAGO	CHRYSLER
20	P										020	CHICAGO	CHRYSLER
21	T		T	T							021	CHICAGO	CHRYSLER
22	T	P									022	CHICAGO	CHRYSLER
23	T		P								023	CHICAGO	CHRYSLER
24	T	T	T	T							024	CHICAGO	CHRYSLER
25	T		T	T							025	CHICAGO	CHRYSLER
26	T	T	P	P	T	T	T	P	T	T	026	CHICAGO	CHRYSLER
27	T		T	T							027	CHICAGO	CHRYSLER
28	T		T	T							028	CHICAGO	CHRYSLER
29	T		P								029	CHICAGO	CHRYSLER
30	T	P									030	CHICAGO	CHRYSLER
31	T	T	P								031	CHICAGO	CHRYSLER
32	P										032	CHICAGO	CHRYSLER
33	T	T		P	T	T	T	T	T	T	033	CHICAGO	CHRYSLER
34	T	T		P		T	T	T	T	P	034	CHICAGO	FORD
35	T	P				T	T	T	T	T	035	CHICAGO	FORD
36	P										036	CHICAGO	FORD
37	P										037	CHICAGO	FORD
38	T		T	T							038	CHICAGO	FORD
39	P					T					039	CHICAGO	FORD
40	P										040	CHICAGO	FORD
41	P					T	T	P	P	P	041	CHICAGO	FORD
42	T	P									042	CHICAGO	FORD
43	P										043	CHICAGO	FORD
44	P	P									044	CHICAGO	FORD
45	P										045	CHICAGO	FORD
46	T		P								046	CHICAGO	FORD
47	T			P		T	P	T			047	CHICAGO	FORD
48	T										048	CHICAGO	FORD
49	T	P									049	CHICAGO	FORD
50	T	T	T	T		T	T	T	T		050	CHICAGO	FORD
51	P	P									051	CHICAGO	FORD
52	P	P									052	CHICAGO	FORD
53	P										053	CHICAGO	FORD
54	P										054	CHICAGO	FORD

TABLE B-35 HISTORY OF ALL TESTS TAKEN BY EACH OF 300 VEHICLES (cont.)

OBS	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	VEHNUM	CITY	MANUFACT
55	T		P								055	CHICAGO	FORD
56	P	P									056	CHICAGO	FORD
57	P										057	CHICAGO	FORD
58	P										058	CHICAGO	FORD
59	P	P				T					059	CHICAGO	FORD
60	P										060	CHICAGO	FORD
61	P										061	CHICAGO	FORD
62	T			P	T	T	P	T	T		062	CHICAGO	FORD
63	T		T	T							063	CHICAGO	FORD
64	P										064	CHICAGO	FORD
65	P		P								065	CHICAGO	FORD
66	P										066	CHICAGO	FORD
67	T	T	T	P							067	CHICAGO	GM
68	P				T	T	P	T		T	068	CHICAGO	GM
69	P	P									069	CHICAGO	GM
70	T		P								070	CHICAGO	GM
71	T	P			T	T	T	T		P	071	CHICAGO	GM
72	P										072	CHICAGO	GM
73	P										073	CHICAGO	GM
74	T		T	T							074	CHICAGO	GM
75	T	T	P								075	CHICAGO	GM
76	P										076	CHICAGO	GM
77	P										077	CHICAGO	GM
78	P										078	CHICAGO	GM
79	P										079	CHICAGO	GM
80	T		P								080	CHICAGO	GM
81	P				T	T	P	T			081	CHICAGO	GM
82	P										082	CHICAGO	GM
83	P				T	P	T	T	T		083	CHICAGO	GM
84	P										084	CHICAGO	GM
85	P										085	CHICAGO	GM
86	P										086	CHICAGO	GM
87	T		P								087	CHICAGO	GM
88	T	P									088	CHICAGO	GM
89	T		T	T							089	CHICAGO	GM
90	T		T								090	CHICAGO	GM
91	T	T	P								091	CHICAGO	GM
92	T		P								092	CHICAGO	GM
93	T		P								093	CHICAGO	GM
94	T	P			T	T	P	P			094	CHICAGO	GM
95	P										095	CHICAGO	GM
96	P										096	CHICAGO	GM
97	T	T	T	T							097	CHICAGO	GM
98	T	T	T	T							098	CHICAGO	GM
99	P	P			T	T	P	T	T	P	099	CHICAGO	GM
100	T		P								100	CHICAGO	GM
101	T		T	P		P	T	T			001	WASHNGTN	CHRYSLER
102	T	T	P								002	WASHNGTN	CHRYSLER
103	T	T	P								003	WASHNGTN	CHRYSLER
104	T		T	T							004	WASHNGTN	CHRYSLER
105	T	T	T								005	WASHNGTN	CHRYSLER
106	P										006	WASHNGTN	CHRYSLER
107	T	T	T	T							007	WASHNGTN	CHRYSLER
108	T	T	P								008	WASHNGTN	CHRYSLER

TABLE B-35 HISTORY OF ALL TESTS TAKEN BY EACH OF 300 VEHICLES (cont.)

OBS	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	VEHNUM	CITY	MANUFACT
109	T		T	T							009	WASHNGTN	CHRYSLER
110	T		P								010	WASHNGTN	CHRYSLER
111	T		T	P	T	T	T	T	T		011	WASHNGTN	CHRYSLER
112	T		P								012	WASHNGTN	CHRYSLER
113	T	T	T	P							013	WASHNGTN	CHRYSLER
114	P										014	WASHNGTN	CHRYSLER
115	T		P								015	WASHNGTN	CHRYSLER
116	T		P								016	WASHNGTN	CHRYSLER
117	T	T	P								017	WASHNGTN	CHRYSLER
118	T	T	T	T							018	WASHNGTN	CHRYSLER
119	T	T	P								019	WASHNGTN	CHRYSLER
120	T	T	P								020	WASHNGTN	CHRYSLER
121	P										021	WASHNGTN	CHRYSLER
122	T	T	T	T							022	WASHNGTN	CHRYSLER
123	T		T	T							023	WASHNGTN	CHRYSLER
124	T	P									024	WASHNGTN	CHRYSLER
125	T		T	T							025	WASHNGTN	CHRYSLER
126	T	T	T	T							026	WASHNGTN	CHRYSLER
127	T		T	P							027	WASHNGTN	CHRYSLER
128	T	T	P								028	WASHNGTN	CHRYSLER
129	T			P		T	T	T	T		029	WASHNGTN	CHRYSLER
130	T	T	P								030	WASHNGTN	CHRYSLER
131	T		T	P		T	T	T	T		031	WASHNGTN	CHRYSLER
132	T	P									032	WASHNGTN	CHRYSLER
133	T	T	T	P							033	WASHNGTN	CHRYSLER
134	P										034	WASHNGTN	FORD
135	P										035	WASHNGTN	FORD
136	P										036	WASHNGTN	FORD
137	P										037	WASHNGTN	FORD
128	P										038	WASHNGTN	FORD
139	T	T		T							039	WASHNGTN	FORD
140	T	T	P	P							040	WASHNGTN	FORD
141	T		P								041	WASHNGTN	FORD
142	T	T	P								042	WASHNGTN	FORD
143	P										043	WASHNGTN	FORD
144	T			T							044	WASHNGTN	FORD
145	T		T	T							045	WASHNGTN	FORD
146	T		T	T							046	WASHNGTN	FORD
147	T	T	T	T							047	WASHNGTN	FORD
148	T	T		T							048	WASHNGTN	FORD
149	T		T	P	T	T	P	T			049	WASHNGTN	FORD
150	T		T	T							050	WASHNGTN	FORD
151	P										051	WASHNGTN	FORD
152	T		T	P		T	T	P	T		052	WASHNGTN	FORD
153	P										053	WASHNGTN	FORD
154	P										054	WASHNGTN	FORD
155	T	T		T							055	WASHNGTN	FORD
156	P										056	WASHNGTN	FORD
157	T		P								057	WASHNGTN	FORD
158	P	T	P		T	P	P				058	WASHNGTN	FORD
159	T	T	T	T							059	WASHNGTN	FORD
160	T	T	T	P	T	T	T	T	T		060	WASHNGTN	FORD
161	T	T	T	T							061	WASHNGTN	FORD
162	T		T	T							062	WASHNGTN	FORD

TABLE B-35 HISTORY OF ALL TESTS TAKEN BY EACH OF 300 VEHICLES (cont.)

OBS	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	VEHNUM	CITY	MANUFACT
163	T	T	T	T							063	WASHNGTN	FORD
164	T		P								064	WASHNGTN	FORD
165	T			T							065	WASHNGTN	FORD
166	P										066	WASHNGTN	FORD
167	T	T	P								067	WASHNGTN	GM
168	P										068	WASHNGTN	GM
169	P										069	WASHNGTN	GM
170	P										070	WASHNGTN	GM
171	T	T	T	T							071	WASHNGTN	GM
172	T		T	T							072	WASHNGTN	GM
173	P			P	T	P	T	P	T		073	WASHNGTN	GM
174	P										074	WASHNGTN	GM
175	P										075	WASHNGTN	GM
176	P										076	WASHNGTN	GM
177	P	P									077	WASHNGTN	GM
173	P										078	WASHNGTN	GM
179	P										079	WASHNGTN	GM
130	T		T	T							080	WASHNGTN	GM
181	T	T	T	T							081	WASHNGTN	GM
182	T		T	T							082	WASHNGTN	GM
183	P										083	WASHNGTN	GM
184	T	T	P								084	WASHNGTN	GM
185	P										085	WASHNGTN	GM
186	T		T	P	T	T	P	T	T		086	WASHNGTN	GM
187	P										087	WASHNGTN	GM
188	T		T	P							088	WASHNGTN	GM
189	T		T	T							089	WASHNGTN	GM
190	P										090	WASHNGTN	GM
191	T		P								091	WASHNGTN	GM
192	T	P									092	WASHNGTN	GM
193	T	T	P								093	WASHNGTN	GM
194	T	T	P								094	WASHNGTN	GM
195	P										095	WASHNGTN	GM
196	T		P		T	P	P	T	P		096	WASHNGTN	GM
197	P										097	WASHNGTN	GM
198	T	T	T	T							098	WASHNGTN	GM
199	P										099	WASHNGTN	GM
200	T	T	P								100	WASHNGTN	GM
201	T		P								001	DETROIT	CHRYSLER
202	T	T	P			T	T	T	T		002	DETROIT	CHRYSLER
203	P										003	DETROIT	CHRYSLER
204	T		P								004	DETROIT	CHRYSLER
205	T	T	P								005	DETROIT	CHRYSLER
206	T	T	T	T							006	DETROIT	CHRYSLER
207	T	T	P								007	DETROIT	CHRYSLER
208	P										008	DETROIT	CHRYSLER
209	T	P									009	DETROIT	CHRYSLER
210	T	T	P								010	DETROIT	CHRYSLER
211	T		T	T							011	DETROIT	CHRYSLER
212	T	T	T	T							012	DETROIT	CHRYSLER
213	T	T	P								013	DETROIT	CHRYSLER
214	P										014	DETROIT	CHRYSLER
215	T		T	T							015	DETROIT	CHRYSLER
216	P										016	DETROIT	CHRYSLER

TABLE B-35 HISTORY OF ALL TESTS TAKEN BY EACH OF 300 VEHICLES (cont.)

OBS	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	VEHNUM	CITY	MANUFACT
217	P	P									017	DETROIT	CHRYSLER
218	T		P								018	DETROIT	CHRYSLER
219	T	P									019	DETROIT	CHRYSLER
220	P										020	DETPOIT	CHRYSLER
221	T		T	P		T	T	T	T		021	DETROIT	CHRYSLER
222	T		T	T							022	DETROIT	CHRYSLER
223	T	T	P								023	DETROIT	CHRYSLER
224	T	P			T	T	T	T	T		024	DETROIT	CHRYSLER
225	T		P		T	T	P	P	T		025	DETROIT	CHRYSLER
226	T	T	P								026	DETROIT	CHRYSLER
227	T		T	T							027	DETROIT	CHRYSLER
228	T	T	P								028	DETROIT	CHRYSLER
229	P										029	DETROIT	CHRYSLER
230	T		T	P							030	DETROIT	CHRYSLER
231	T	P									031	DETROIT	CHRYSLER
232	P										032	DETROIT	CHRYSLER
233	T										033	DETROIT	CHRYSLER
234	P	P									034	DETROIT	FORD
235	P				T	P	T	P	P		035	DETROIT	FORD
236	P										036	DETROIT	FORD
237	P	P									037	DETROIT	FORD
238	P										038	DETROIT	FORD
239	P										039	DETROIT	FORD
240	P				T	P	T	P	P		040	DETROIT	FORD
241	P										041	DETROIT	FORD
242	P										042	DETROIT	FORD
243	P										043	DETROIT	FORD
244	T		P								044	DETROIT	FORD
245	P										045	DETROIT	FORD
246	T	T	T	P	T	P	T	P	P		046	DETROIT	FORD
247	T	T	T	T	T						047	DETROIT	FORD
248	T		T	T							048	DETROIT	FORD
249	T	T	T	T							049	DETROIT	FORD
250	P										050	DETROIT	FORD
251	P										051	DETROIT	FORD
252	P										052	DETROIT	FORD
253	P										053	DETROIT	FORD
254	P										054	DETROIT	FORD
255	P	T	P								055	DETROIT	FORD
256	P	P									056	DETROIT	FORD
257	P										057	DETROIT	FORD
258	P										058	DETROIT	FORD
259	T		T	P							059	DETROIT	FORD
260	T	P									060	DETROIT	FORD
261	T		T	T							061	DETROIT	FORD
262	T		T	T							062	DETROIT	FORD
263	P										063	DETROIT	FORD
264	P	P			T	P	T	T	P		064	DETROIT	FORD
265	P										065	DETROIT	FORD
266	P				T	P	T	P	P		066	DETROIT	FORD
267	T		P								067	DETROIT	GM
268	P				T						068	DETROIT	GM
269	T	P									069	DETROIT	GM
270	P										070	DETROIT	GM

TABLE B-35 HISTORY OF ALL TESTS TAKEN BY EACH OF 300 VEHICLES (cont.)

OBS	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	VEHNUM	CITY	MANUFACT
271	P	P									071	DETROIT	GM
272	P										072	DETROIT	GM
273	P										073	DETROIT	GM
274	P										074	DETROIT	GM
275	P										075	DETROIT	GM
276	T	T	P								076	DETROIT	GM
277	T	T	P								077	DETROIT	GM
278	P										078	DETROIT	GM
279	T	T	P								079	DETROIT	GM
280	T	P									080	DETROIT	GM
281	P										081	DETROIT	GM
282	T		T								082	DETROIT	GM
283	P				T	P	P	T	P		083	DETROIT	GM
284	T	T	T	T							084	DETROIT	GM
285	T	T	P								085	DETROIT	GM
286	P										085	DETROIT	GM
287	T	T	P								087	DETROIT	GM
288	P	P									088	DETROIT	GM
289	T		P								089	DETROIT	GM
290	P				T	P	T	P	P		090	DETROIT	GM
291	P	P			T	P	T	P	P		091	DETROIT	GM
292	P	P									092	DETROIT	GM
293	T	P									093	DETROIT	GM
294	P										094	DETROIT	GM
295	P										095	DETROIT	GM
296	T		P								096	DETROIT	GM
297	T	P									097	DETROIT	GM
298	T		T								098	DETROIT	GM
299	T	T	T	P							099	DETROIT	GM
300	T	T									100	DETROIT	GM

APPENDIX C

General Note: Discrepancies in the number of tests, observations or cars in the following tables are due to unavailable data.

TABLE C-1 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE FEDERAL SHORT CYCLE

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. TESTS	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	834	0.84294	0.49568	0.85132	0.01801
COLD TRANSIENT HYDROCARBONS (gms)	834	2.70981	5.53796	0.48099	0.17124
COLD STABILIZED HYDROCARBONS (gms)	834	3.81907	0.29637	0.88544	0.06949
HOT TRANSIENT HYDROCARBONS (gms)	834	2.36412	1.79363	0.82814	0.05547
FTP CARBON MONOXIDE (gms/mi)	834	0.98522	7.29757	0.87635	0.01877
COLD TRANSIENT CARBON MONOXIDE (gms)	834	3.02548	87.60505	0.50893	0.17741
COLD STABILIZED CARBON MONOXIDE (gms)	834	4.82015	8.85299	0.90857	0.07683
HOT TRANSIENT CARBON MONOXIDE (gms)	834	2.22467	14.40104	0.84609	0.04859
FTP NO_X (gms/mi)	832*	0.87829	1.00083	0.82580	0.02082
COLD TRANSIENT NO_X (gms)	832*	3.75346	4.26855	0.70371	0.09490
COLD STABILIZED NO_X (gms)	834	3.08948	6.01500	0.82865	0.10814
HOT TRANSIENT NO_X (gms)	834	3.11973	2.48457	0.80830	0.07306

*Missing data

TABLE C-2 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE NEW YORK, NEW JERSEY SHORT CYCLE TEST

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. TESTS	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	834	0.43369	0.60207	0.77054	0.01244
COLD TRANSIENT HYDROCARBONS (gms)	834	1.30789	6.00735	0.40840	0.10134
COLD STABILIZED HYDROCARBONS (gms)	834	2.00263	0.72269	0.81682	0.04903
HOT TRANSIENT HYDROCARBONS (gms)	834	1.21517	2.09372	0.74885	0.03728
FTP CARBON MONOXIDE (gms/mi)	834	0.49091	7.09431	0.83369	0.01127
COLD TRANSIENT CARBON MONOXIDE (gms)	834	1.37479	89.59516	0.44153	0.09685
COLD STABILIZED CARBON MONOXIDE (gms)	834	2.46203	6.67122	0.88603	0.04466
HOT TRANSIENT CARBON MONOXIDE (gms)	834	1.10286	14.05294	0.80082	0.02859
FTP NO_X (gms/mi)	832 *	1.09535	0.49999	0.86724	0.02183
COLD TRANSIENT NO_X (gms)	834	4.46300	2.65186	0.71772	0.11243
COLD STABILIZED NO_X (gms)	834	3.74017	4.52035	0.90807	0.12580
HOT TRANSIENT NO_X (gms)	832 *	4.05794	0.30016	0.80931	0.06489

*missing data

TABLE C-3 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE TWO SPEED IDLE SHORT TEST AT IDLE NEUTRAL FOR ALL TEST SEQUENCES COMBINED

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. OBSER-VATIONS*	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	547	0.00329	0.80504	0.66310	0.00016
COLD TRANSIENT HYDROCARBONS (gms)	547	0.01019	6.21459	0.41058	0.00097
COLD STABILIZED HYDROCARBONS (gms)	547	0.01476	1.85566	0.68072	0.00068
HOT TRANSIENT HYDROCARBONS (gms)	547	0.00890	2.64885	0.63259	0.00046
FTP CARBON MONOXIDE (gms/mi)	547	7.45041	8.89072	0.75061	0.30516
COLD TRANSIENT CARBON MONOXIDE (gms)	547	20.58886	88.71664	0.39952	2.20458
COLD STABILIZED CARBON MONOXIDE (gms)	547	38.17854	17.18503	0.80109	1.24445
HOT TRANSIENT CARBON MONOXIDE (gms)	547	15.51993	19.90745	0.71381	0.80664
FTP NO_X (gms/mi)	547	0.00336	2.76132	0.18771	0.00075
COLD TRANSIENT NO_X (gms)	547	0.01191	12.21772	0.15617	0.00323
COLD STABILIZED NO_X (gms)	547	0.01370	8.45804	0.22089	0.00259
HOT TRANSIENT NO_X (gms)	547	0.01116	12.27761	0.14172	0.00334

*no data available

TABLE C-4 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE TWO SPEED IDLE SHORT TEST AT 2250 RPM FOR ALL TEST SEQUENCES COMBINED

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. OBSER-VATIONS*	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	547	0.00344	1.00582	0.29082	0.00048
COLD TRANSIENT HYDROCARBONS (gms)	547	0.01393	6.66620	0.23059	0.00252
COLD STABILIZED HYDROCARBONS (gms)	547	0.01330	2.91923	0.25230	0.00218
HOT TRANSIENT HYDROCARBONS (gms)	547	0.01147	3.08409	0.33520	0.00138
FTP CARBON MONOXIDE (gms/mi)	547	19.92042	13.97040	0.49677	1.49073
COLD TRANSIENT CARBON MONOXIDE (gms)	547	97.40506	98.11350	0.45172	8.24064
COLD STABILIZED CARBON MONOXIDE (gms)	547	76.22229	46.04798	0.40842	7.29704
HOT TRANSIENT CARBON MONOXIDE (gms)	547	54.90645	29.01964	0.57840	3.31702
FTP NO_X (gms/mi)	547	0.00333	2.31485	0.46785	0.00027
COLD TRANSIENT NO_X (gms)	547	0.01340	10.29297	0.44113	0.00116
COLD STABILIZED NO_X (gms)	547	0.01043	7.32175	0.42231	0.00096
HOT TRANSIENT NO_X (gms)	547	0.01545	9.84850	0.49255	0.00117

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* no data available

TABLE C-5 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE CLAYTON KEY MODE IDLE SHORT TEST FOR ALL TEST SEQUENCES COMBINED

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. OBSER-VATIONS*	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	547	0.00481	0.70774	0.72389	0.00020
COLD TRANSIENT HYDROCARBONS (gms)	547	0.01505	5.92256	0.44393	0.00130
COLD STABILIZED HYDROCARBONS (gms)	547	0.02231	1.37759	0.75387	0.00083
HOT TRANSIENT HYDROCARBONS (gms)	547	0.01281	2.42762	0.66724	0.00061
FTP CARBON MONOXIDE (gms/mi)	547	6.55794	8.66259	0.71605	0.28945
COLD TRANSIENT CARBON MONOXIDE (gms)	547	18.08043	88.13429	0.37560	2.02620
COLD STABILIZED CARBON MONOXIDE (gms)	547	33.63270	15.98454	0.76557	1.20376
HOT TRANSIENT CARBON MONOXIDE (gms)	547	13.64427	19.45112	0.68216	0.75518
FTP NO_X (gms/mi)	547	0.00180	2.67810	0.24367	0.00030
COLD TRANSIENT NO_X (gms)	547	0.00626	11.94764	0.19820	0.00132
COLD STABILIZED NO_X (gms)	547	0.00753	8.08197	0.29457	0.00104
HOT TRANSIENT NO_X (gms)	547	0.00575	12.04620	0.17640	0.00136

*no data available

TABLE C-6 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE CLAYTON KEY MODE LOW CRUISE SHORT TEST FOR ALL TEST SEQUENCES COMBINED

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. OBSERVATIONS*	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	547	0.01224	0.65778	0.49120	0.00093
COLD TRANSIENT HYDROCARBONS (gms)	547	0.05004	5.23377	0.39383	0.00500
COLD STABILIZED HYDROCARBONS (gms)	547	0.04912	1.49123	0.44275	0.00426
HOT TRANSIENT HYDROCARBONS (gms)	547	0.03709	2.09041	0.51543	0.00264
FTP CARBON MONOXIDE (gms/mi)	547	23.32693	13.90891	0.49863	1.92679
COLD TRANSIENT CARBON MONOXIDE (gms)	547	112.18978	97.99295	0.48570	10.63638
COLD STABILIZED CARBON MONOXIDE (gms)	547	93.29661	45.42410	0.41412	9.27743
HOT TRANSIENT CARBON MONOXIDE (gms)	547	58.62059	29.39611	0.54541	4.48277
FTP NO_X (gms/mi)	547	0.00136	1.82050	0.61908	0.00007
COLD TRANSIENT NO_X (gms)	547	0.005181	8.57629	0.55142	0.00033
COLD STABILIZED NO_X (gms)	547	0.00445	5.61170	0.58271	0.00027
HOT TRANSIENT NO_X (gms)	547	0.00623	7.63909	0.64238	0.00032

*no data available

TABLE C-7 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE CLAYTON KEY MODE HIGH CRUISE SHORT TEST FOR ALL TEST SEQUENCES COMBINED

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. OBSER-VATIONS*	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	547	0.00957	0.82910	0.28839	0.00136
COLD TRANSIENT HYDROCARBONS (gms)	547	0.05442	5.32374	0.32146	0.00687
COLD STABILIZED HYDROCARBONS (gms)	547	0.02904	2.55395	0.19647	0.00620
HOT TRANSIENT HYDROCARBONS (gms)	547	0.03396	2.41246	0.35410	0.00384
FTP CARBON MONOXIDE (gms/mi)	547	0.13696	16.06547	0.09703	0.06518
COLD TRANSIENT CARBON MONOXIDE (gms)	547	0.96678	108.16820	0.14313	0.34947
COLD STABILIZED CARBON MONOXIDE (gms)	547	0.50528	54.07646	0.07490	0.30380
HOT TRANSIENT CARBON MONOXIDE (gms)	547	0.18633	34.91633	0.05233	0.15472
FTP NO$_X$ (gms/mi)	547	0.00106	1.30280	0.71593	0.00004
COLD TRANSIENT NO$_X$ (gms)	547	0.00451	5.88014	0.70842	0.00019
COLD STABILIZED NO$_X$ (gms)	547	0.00320	4.38600	0.61859	0.00017
HOT TRANSIENT NO$_X$ (gms)	547	0.00504	5.01149	0.76758	0.00018

*no data available

TABLE C-8 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE FEDERAL THREE MODE IDLE IN NEUTRAL SHORT TEST FOR ALL TEST SEQUENCES COMBINED

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. OBSERVATIONS*	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	547	0.00260	0.83096	0.64472	0.00013
COLD TRANSIENT HYDROCARBONS (gms)	547	0.00821	6.29473	0.40005	0.00081
COLD STABILIZED HYDROCARBONS (gms)	547	0.01185	1.97659	0.66089	0.00057
HOT TRANSIENT HYDROCARBONS (gms)	547	0.00717	2.71726	0.61659	0.00039
FTP CARBON MONOXIDE (gms/mi)	547	6.53238	8.91903	0.72540	0.30268
COLD TRANSIENT CARBON MONOXIDE (gms)	547	17.47236	89.43667	0.37850	2.08643
COLD STABILIZED CARBON MONOXIDE (gms)	547	33.65637	17.12840	0.75985	1.26568
HOT TRANSIENT CARBON MONOXIDE (gms)	547	13.72523	19.83614	0.75411	0.77881
FTP NO_X (gms/mi)	547	0.00261	2.81308	0.18918	0.00058
COLD TRANSIENT NO_X (gms)	547	0.01029	12.31243	0.17532	0.00246
COLD STABILIZED NO_X (gms)	547	0.00977	8.74357	0.20444	0.00199
HOT TRANSIENT NO_X (gms)	547	0.00941	12.38628	0.15486	0.00255

* no data available

TABLE C-9 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE FEDERAL THREE MODE IDLE IN DRIVE SHORT TEST FOR ALL TEST SEQUENCES COMBINED

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. OBSER-VATIONS*	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	547	0.00470	0.77369	0.72425	0.00022
COLD TRANSIENT HYDROCARBONS (gms)	547	0.01390	6.20292	0.41977	0.00142
COLD STABILIZED HYDROCARBONS (gms)	547	0.02194	1.66940	0.75847	0.00096
HOT TRANSIENT HYDROCARBONS (gms)	547	0.01285	2.57197	0.68213	0.00068
FTP CARBON MONOXIDE (gms/mi)	547	6.78774	8.93084	0.73169	0.30325
COLD TRANSIENT CARBON MONOXIDE (gms)	547	18.72482	88.8624	0.38157	2.11200
COLD STABILIZED CARBON MONOXIDE (gms)	547	34.77809	17.39561	0.78109	1.26641
HOT TRANSIENT CARBON MONOXIDE (gms)	547	14.17248	19.95595	0.70327	0.78776
FTP NO_X (gms/mi)	547	0.00157	2.71339	0.22862	0.00029
COLD TRANSIENT NO_X (gms)	547	0.00559	12.04599	0.19409	0.00123
COLD STABILIZED NO_X (gms)	547	0.00654	8.24077	0.27146	0.00098
HOT TRANSIENT NO_X (gms)	547	0.00504	12.15767	0.16667	0.00128

*no data available

TABLE C-10 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE FEDERAL THREE MODE LOW SPEED SHORT TEST FOR ALL TEST SEQUENCES COMBINED

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. OBSER-VATIONS *	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	547	0.00505	0.97788	0.33363	0.00061
COLD TRANSIENT HYDROCARBONS (gms)	547	0.01977	6.58290	0.25624	0.00319
COLD STABILIZED HYDROCARBONS (gms)	547	0.02074	2.75402	0.30780	0.00274
HOT TRANSIENT HYDROCARBONS (gms)	547	0.01512	3.06913	0.34598	0.00176
FTP CARBON MONOXIDE (gms/mi)	547	29.78253	14.13455	0.47362	2.75211
COLD TRANSIENT CARBON MONOXIDE (gms)	547	156.64002	98.16988	0.46368	14.86819
COLD STABILIZED CARBON MONOXIDE (gms)	547	107.04765	47.14441	0.36698	13.35235
HOT TRANSIENT CARBON MONOXIDE (gms)	547	85.90549	29.21348	0.56081	6.16649
FTP NO_X (gms/mi)	547	0.00123	1.59362	0.72297	0.00005
COLD TRANSIENT NO_X (gms)	547	0.00491	7.47036	0.67267	0.00023
COLD STABILIZED NO_X (gms)	547	0.00402	4.88988	0.67778	0.00019
HOT TRANSIENT NO_X (gms)	547	0.00552	6.75435	0.73293	0.00022

*no data available

TABLE C-11 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE FEDERAL THREE MODE HIGH SPEED SHORT TEST FOR ALL TEST SEQUENCES COMBINED

DEPENDENT VARIABLE, Y (where Y is of the form mx + b)	NO. OBSER- VATIONS*	SLOPE (m)	INTERCEPT (b)	CORRELATION COEFFICIENT	STANDARD ERROR OF ESTIMATE OF SLOPE
FTP HYDROCARBONS (gms/mi)	547	0.00435	1.02396	0.28841	0.00062
COLD TRANSIENT HYDROCARBONS (gms)	547	0.01931	6.66582	0.25090	0.00319
COLD STABILIZED HYDROCARBONS (gms)	547	0.01708	2.97781	0.25418	0.00278
HOT TRANSIENT HYDROCARBONS (gms)	547	0.01274	3.22031	0.29211	0.00179
FTP CARBON MONOXIDE (gms/mi)	547	13.23130	15.05013	0.40668	1.51146
COLD TRANSIENT CARBON MONOXIDE (gms)	547	85.45049	101.66340	0.51871	7.87097
COLD STABILIZED CARBON MONOXIDE (gms)	547	32.81122	51.66433	0.21350	7.38011
HOT TRANSIENT CARBON MONOXIDE (gms)	547	52.06990	30.69547	0.63923	3.10288
FTP NO_X (gms/mi)	547	0.00111	1.13052	0.74346	0.00004
COLD TRANSIENT NO_X (gms)	547	0.00484	4.91387	0.75758	0.00018
COLD STABILIZED NO_X (gms)	547	0.00328	3.97161	0.63093	0.00017
HOT TRANSIENT NO_X (gms)	547	0.00526	4.20062	0.79691	0.00017

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* no data available

TABLE C-12 MULTIPLE LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE TWO SPEED IDLE SHORT CYCLE

DEPENDENT VARIABLE, Y (where Y is of the form $m_1x_1+m_2x_2+b$)	NO. CARS	SLOPE 1 (STD. ERROR OF ESTIMATE) FOR IDLE NEUTRAL	SLOPE 2 (STD. ERROR OF ESTIMATE) FOR IDLE AT 2250 RPM	INTERCEPT (b)	CORRELATION COEFFICIENT
FTP HYDROCARBONS (gms/mi)	200	0.00364 (0.00034)	-0.00094 (0.00146	0.86236	0.66152
COLD TRANSIENT HYDROCARBONS (gms)	200	0.01270 (0.00196)	0.00228 (0.00841)	5.65523	0.49171
COLD STABILIZED HYDROCARBONS (gms)	200	0.01680 (0.00150)	-0.00867 (0.00644	2.45257	0.66718
HOT TRANSIENT HYDROCARBONS (gms)	200	0.00887 (0.00101	0.00110 (0.00435)	2.77780	0.60314
FTP CARBON MONOXIDE (gms/mi)	200	7.21046 (0.44335)	11.51527 (1.59783)	8.02769	0.80608
COLD TRANSIENT CARBON MONOXIDE (gms)	200	21.42764 (3.00719)	48.13347 (10.83768)	69.98469	0.54518
COLD STABILIZE CARBON MONOXIDE (gms)	200	36.75386 (1.97776)	44.65360 (7.12770)	18.96830	0.82972
HOT TRANSIENT CARBON MONOXIDE (gms)	200	14.22928 (1.09810)	36.86592 (3.95745)	19.55443	0.77855
FTP NO_X (gms/mi)	200	0.00093 (0.00089)	0.00339 (0.00048)	1.98417	0.45851
COLD TRANSIENT NO_X (gms)	200	0.00179 (0.00393)	0.01629 (0.00211)	8.72591	0.48405
COLD STABILIZED NO_X (gms)	200	0.00606 (0.00319)	0.00942 (0.00172)	6.23945	0.38868
HOT TRANSIENT NO_X (gms)	200	0.00024 (0.00389)	0.01586 (0.00209	8.57836	0.47558

TABLE C-13 MULTIPLE LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE CLAYTON MODE SHORT CYCLE

DEPENDENT VARIABLE, Y (where Y is of the form $m_1x_1m_2x_2+b$)	NO. CARS	SLOPE 1 (STD. ERROR OF ESTIMATE FOR IDLE	SLOPE 2 (STD. ERROR OF ESTIMATE) FOR LOW CRUISE	SLOPE 3 (STD. ERROR OF ESTIMATE) FOR HIGH CRUISE	INTERCEPT (b)	CORRELATION COEFFICIENT
FTP HYDROCARBONS (gms/mi)	200	0.00581 (0.00036)	0.00111 (0.00167)	0.00323 (0.00194)	0.47160	0.80293
COLD TRANSIENT HYDROCARBONS (gms)	200	0.02077 (0.00237	-0.00329 (0.01091)	0.03961 (0.01260)	3.74735	0.62344
COLD STABILIZED HYDROCARBONS (gms)	200	0.02704 (0.00159)	0.00564 (0.00733)	-0.00283 (0.00847)	1.05669	0.80937
HOT TRANSIENT HYDROCARBONS (gms)	200	0.01332 (0.00117)	0.00719 (0.00539)	0.01767 (0.00623)	1.52449	0.72964
FTP CARBON MONOXIDE (gms/mi)	200	6.07568 (0.43501)	20.20634 (0.18461)	0.06233 (0.04807)	8.10163	0.78049
COLD TRANSIENT CARBON MONOXIDE (gms)	200	17.64227 (2.85018)	68.86593 (20.86541)	0.74706 (0.31495)	71.17720	0.51789
COLD STABILIZE CARBON MONOXIDE (gms)	200	30.95780 (1.87569)	94.34365 (13.73143)	0.14533 0.20727)	18.40627	0.82169
HOT TRANSIENT CARBON MONOXIDE (gms)	200	12.32189 (1.15907)	48.40628 (8.48525)	0.00163 (0.12808)	20.61361	0.70096
FTP NO_X (gms/mi)	200	0.00099 (0.00028)	0.00055 (0.00013)	0.00063 (0.00008)	1.20231	0.74109
COLD TRANSIENT NO_X (gms)	200	0.00182 (0.00131)	0.00116 (0.00060)	0.00351 (0.00038)	5.76356	0.72273
HOT TRANSIENT NO_X (gms)	200	0.00191 (0.00121)	0.00214 (0.00055)	0.00316 (0.00035)	5.13806	0.76022

TABLE C-14 MULTIPLE LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF FTP AND BAG EMISSIONS REGRESSED ON THE FEDERAL THREE MODE SHORT CYCLE

DEPENDENT VARIABLE, Y (where Y is of the form $m_1x_1+m_2x_2+m_3x_3+m_4x_4+b$)	NO. CARS	SLOPE 1 (STD. ERROR OF ESTIMATE) FOR IDLE IN NEUTRAL	SLOPE 2 (STD. ERROR OF ESTIMATE) FOR IDLE IN DRIVE	SLOPE 3 (STD. ERROR OF ESTIMATE) FOR LOW SPEED	SLOPE 4 (STD. ERROR OF ESTIMATE) FOR HIGH SPEED	INTERCEPT (b)	CORRELATION COEFFICIENT
FTP HYDROCARBONS	200	0.00005 (0.00041)	0.00508 (0.00069)	0.00783 (0.00286)	-0.00352 (0.00323)	0.52898	0.76863
COLD TRANSIENT HYDROCARBONS (gms)	200	-0.00109 (0.00260	0.01790 (0.00437)	0.01436 (0.01810)	0.02506 (0.02049)	4.04200	0.57715
COLD STABILIZED HYDROCARBONS (gms)	200	0.00061 (0.00180)	0.02391 (0.00302)	0.03354 (0.01251)	-0.02899 (0.01416)	1.20301	0.77643
HOT TRANSIENT HYDROCARBONS (gms)	200	0.00041 (0.00124	0.01143 (0.00208)	0.03335 (0.00862)	-0.01440 (0.00976)	1.80054	0.72536
FTP CARBON MONOXIDE (gms/mi)	200	2.75742 (1.14165)	4.11232 (1.10973)	15.01588 (4.02279)	7.94172 (2.34602)	6.78319	0.82648
COLD TRANSIENT CARBON MONOXIDE (gms)	200	7.27927 (7.58314)	13.36517 (7.37116)	26.18249 (26.72045)	75.09642 (15.58294)	65.15064	0.62459
COLD STABILIZE CARBON MONIXIDE (gms)	200	13.84532 (5.34400)	20.75439 (5.19459)	76.93125 (18.83038)	5.93576 (10.98157)	14.11868	0.83040
HOT TRANSIENT CARBON MONOXIDE (gms)	200	6.50049 (2.24100)	7.61584 (2.17832)	42.85862 (7.89643)	37.43106 (4.60507)	15.33417	0.88100
FTP NO_X (gms/mi)	200	-0.00030 (0.00062)	0.00098 (0.00027)	0.00053 (0.00012)	0.00062 (0.00009)	1.06730	0.80478
COLD TRANSIENT NO_X (gms)	200	-0.00019 (0.00282)	0.00164 (0.00122)	0.00056 (0.00054)	0.00413 (0.00043)	4.86349	0.80079
COLD STABILIZED NO_X (gms)	200	-0.00072 (0.00249)	0.00556 (0.00108)	0.00289 (0.00048)	0.00080 (0.00037)	3.38632	0.72764
HOT TRANSIENT NO_X (gms)	200	-0.00252 (0.00254)	0.00194 (0.00110)	0.00147 (0.00049)	0.00367 (0.00038)	4.43357	0.83687

TABLE C-15 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN THE FEDERAL SHORT CYCLE AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (where Y is of the form mx+b)	NO. CARS	SLOPE (STD. ERROR OF ESTIMATE)	INTERCEPT (b)	CORRELATION COEFFICIENT
% Reduction between Tests 1 & 2	HC	113	0.37663 (0.04431)	4.50151	0.62793
	CO	113	0.00841 (0.00862)	11.89804	0.09228
	NO_X	112 *	0.78901 (0.03693)	0.24759	0.89766
% Reduction between Tests 2 & 3	HC	68	0.51145 (0.04759)	15.58995	0.79773
	CO	67 *	0.64361 (0.06935)	10.33227	0.75490
	NO_X	68	0.46993 (0.07053)	0.16110	0.63416
% Reduction between Tests 3 & 4	HC	72	0.23561 (0.05379)	3.67988	0.46376
	CO	72	0.03449 (0.01366	2.57304	0.28886
	NO_X	72	0.14098 (0.03861)	6.07286	0.39993

*missing data

TABLE C-16 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN THE NY & NJ SHORT CYCLE AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (where Y is of the form mx+b)	NO. CARS	SLOPE (STD. ERROR OF ESTIMATE)	INTERCEPT (b)	CORRELATION COEFFICIENT
% Reduction between Tests 1 & 2	HC	113	0.11274 (0.02546)	5.67922	0.38745
	CO	111	-0.00048 (0.00123)	11.25483	0.03805
	NO_X	112	0.73067 (0.05021)	0.90156	0.81125
% Reduction between Tests 2 & 3	HC	68	0.42758 (0.04855)	19.61443	0.73505
	CO	68	0.32657 (0.04652)	34.26640	0.65956
	NO_X	68	0.39653 (0.05632)	0.63837	0.65492
% Reduction between Tests 3 & 4	HC	72	0.12913 (0.03452	4.56187	0.40815
	CO	71	0.03247 (0.01376)	1.99214	0.27328
	NO_X	72	0.62757 (0.06046)	4.19505	0.77857

TABLE C-17 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN TWO SPEED IDLE @2250 AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (WHERE Y IS OF FORM mx + b)	NO. CARS	SLOPE (STD. ERROR OF ESTIMATE)	INTERCEPT, b	CORRELATION COEFFICIENT
% REDUCTION BETWEEN TESTS 1 & 2	Hc	75	.01658 (.0451)	8.156	.04298
	Co	58	-.0322 (.0679)	13.608	-.0632
	NO_X	75	.025 (.0634)	2.62	.4189
% REDUCTION BETWEEN TESTS 2 & 3	Hc	37	.0757 (.038)	30.82	.3194
	Co	32	.0059 (.0189)	51.378	.0569
	NO_X	23	.122 (.0056)	-4.07	.978
% REDUCTION BETWEEN TESTS 3 & 4	Hc	37	.0362 (.0134)	.08525	.416
	Co	30	.228 (.0055)	11.32	.992
	NO_X	25	.0611 (.1564)	2.397	.08118

TABLE C-18 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN TWO SPEED IDLE @ IDLE AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (WHERE Y IS OF FORM mx + b)	NO. CARS	SLOPE STD. ERROR OF ESTIMATE)	INTERCEPT, b	CORRELATION COEFFICIENT
% REDUCTION BETWEEN TESTS 1 & 2	Hc	75	.0422 (.0197)	9.256	.2428
	Co	63	.00018 (.0011)	14.956	.01967
	NO_X	75	-.034 (.0536)	1.9	-.0737
% REDUCTION BETWEEN TESTS 2 & 3	Hc	37	.1516 (.04)	25.14	.5385
	Co	33	.0899 (.0602)	47.065	.259
	NO_X	23	.399 (.02)	3.134	.974
% REDUCTION BETWEEN TESTS 3 & 4	Hc	37	.0433 (.0317)	-.539	.2246
	Co	30	-.0122 (.0866)	-56.8	-.02667
	NO_X	25	.0612 (.109)	2.78	.1164

TABLE C-19 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN CLAYTON KEY MODE HIGH AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (WHERE Y IS OF FORM mx + b)	NO. CARS	SLOPE (STD. ERROR OF ESTIMATE)	INTERCEPT, b	CORRELATION COEFFICIENT
% REDUCTION BETWEEN TESTS 1 & 2	Hc	75	.172 (.07)	8.34	.2767
	Co	59	.01 (.0398)	13.89	.0342
	NO_X	75	.203 (.042)	3.58	.49
% REDUCTION BETWEEN TESTS 2 & 3	Hc	37	.0206 (.085)	27.85	.0408
	Co	28	.001 (.004)	49.4	.0648
	NO_X	23	.136 (.126)	-18.34	.2285
% REDUCTION BETWEEN TESTS 3 & 4	Hc	37	.1353 (.095)	-1.38	.233
	Co	31	-.822 (1.28)	-25.46	-.1181
	NO_X	25	.332 (.134)	1.62	.4596

TABLE C-20 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN CLAYTON KEY MODE LOW AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (WHERE Y IS OF FORM mx + b)	NO. CARS	SLOPE STD. ERROR OF ESTIMATE)	INTERCEPT, b	CORRELATION COEFFICIENT
% REDUCTION BETWEEN TESTS 1 & 2	Hc	75	.0601 (.045)	8.09	.155
	Co	59	.0074 (.0313)	14.77	.0313
	NO_X	75	.0852 (.0318)	3.93	.2993
% REDUCTION BETWEEN TESTS 2 & 3	Hc	37	.1365 (.072)	29.41	.3044
	Co	28	-.0042 (.0525)	48.94	-.0156
	NO_X	23	.6498 (.04)	-7.5	.962
% REDUCTION BETWEEN TESTS 3 & 4	Hc	37	.1682 (.0556)	.746	.4552
	Co	30	.2482 (.0115)	26.012	.971
	NO_X	25	.203 (.0846)	4.281	.4476

TABLE C-21 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN CLAYTON KEY MODE IDLE AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (WHERE Y IS OF FORM mx + b)	NO. CARS	SLOPE (STD. ERROR OF ESTIMATE)	INTERCEPT, b	CORRELATION COEFFICIENT
% REDUCTION BETWEEN TESTS 1 & 2	Hc	75	.1155 (.0314)	8.776	.395
	Co	64	.000089 (.00099)	16.576	.0115
	NO_X	75	.2042 (.0153)	4.546	.182
% REDUCTION BETWEEN TESTS 2 & 3	Hc	37	.326 (.091)	14.12	.5188
	Co	34	.7078 (.126)	-1.673	.7043
	NO_X	23	.136 (.126)	-18.34	.2285
% REDUCTION BETWEEN TESTS 3 & 4	Hc	37	.029 (.07)	-2.97	.0692
	Co	31	-.0093 (.074)	-53.77	-.0233
	NO_X	25	.1435 (.0578)	6.29	.46

TABLE C-22 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN FEDERAL THREE MODE HIGH SPEED AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (WHERE Y IS OF FORM mx + b)	NO. CARS	SLOPE (STD. ERROR OF ESTIMATE)	INTERCEPT, b	CORRELATION COEFFICIENT
% REDUCTION BETWEEN TESTS 1 & 2	Hc	75	.1268 (.0747)	7.853	.19487
	Co	61	.01866 (.0271)	14.189	.08927
	NO_X	75	.30512 (.037)	3.8396	.69313
% REDUCTION BETWEEN TESTS 2 & 3	Hc	37	.0303 (.0897)	28.044	.05708
	Co	29	.000897 (.00563)	50.1633	.03063
	NO_X	23	.444 (.307)	-25.09	.301
% REDUCTION BETWEEN TESTS 3 & 4	Hc	37	.18269 (.1097)	-1.929	.27097
	Co	31	-.841 (1.081)	-31.77	-.143
	NO_X	25	.336 (.1596)	1.302	.402

TABLE C-23 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN FEDERAL THREE MODE LOW SPEED AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (WHERE) Y IS OF FORM mx + b)	NO. CARS	SLOPE (STD. ERROR OF ESTIMATE)	INTERCEPT, b	CORRELATION COEFFICIENT
% REDUCTION BETWEEN TESTS 1 & 2	Hc	75	.0742 (.0693)	7.956	.1244
	Co	62	.0108 (.0331)	15.97	.04212
	NO_X	75	.395 (.0456)	4.871	.7115
% REDUCTION BETWEEN TESTS 1 & 2	Hc	37	.1046 (.0605)	29.73	.2805
	Co	31	-.02121 (.0198)	49.1	-.1953
	NO_X	23	.3837 (.0193)	-1.174	.9744
% REDUCTION BETWEEN TESTS 1 & 2	Hc	37	.1967 (.0799)	-1.1636	.3844
	Co	30	-.76455 (.8618)	-35.615	-.1653
	NO_X	25	.2291 (.0963)	2.809	.444

TABLE C-24 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN FEDERAL THREE MODE IDLE IN DRIVE AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (WHERE Y IS OF FORM mx + b)	NO. CARS	SLOPE (STD. ERROR OF ESTIMATE)	INTERCEPT, b	CORRELATION COEFFICIENT
% REDUCTION BETWEEN TESTS 1 & 2	Hc	75	.2304 (.0475)	6.95	.4987
	Co	64	.258 (.0695)	11.835	.4269
	NO_X	73	.0128 (.0217)	3.95	.0702
% REDUCTION BETWEEN TESTS 2 & 3	Hc	35	.3059 (.0816)	14.2	.5467
	Co	33	.7766 (.1186)	-7.062	.7619
	NO_X	21	.2709 (.0211)	7.214	.947
% REDUCTION BETWEEN TESTS 3 & 4	Hc	34	.008 (.058)	-.629	.0243
	Co	29	-.0132 (.0994)	-56.8	-.0256
	NO_X	22	.1339 (.0586)	5.221	.4547

TABLE C-25 LINEAR REGRESSION AND CORRELATION COEFFICIENTS OF THE PERCENT REDUCTION IN FTP EMISSIONS REGRESSED ON THE PERCENT REDUCTION IN FEDERAL THREE MODE IDLE IN NEUTRAL AT EACH TEST SEQUENCE

TEST SEQUENCE	DEPENDENT VARIABLE, Y (WHERE Y IS OF FORM mx + b)	NO. CARS	SLOPE (STD. ERROR OF ESTIMATE)	INTERCEPT, b	CORRELATION COEFFICIENT
% REDUCTION BETWEEN TESTS 1 & 2	Hc	74	.1564 (.0272)	9.84	.56
	Co	66	.2089 (.0421)	14.275	.5275
	NO_X	74	.00642 (.0117)	3.669	.0646
% REDUCTION BETWEEN TESTS 2 & 3	Hc	37	.1143 (.0356)	25.6	.477
	Co	33	.0672 (.0493)	48.753	.2381
	NO_X	23	.4264 (.0257)	5.937	.964
% REDUCTION BETWEEN TESTS 3 & 4	Hc	37	.0394 (.0273)	-.318	.2368
	Co	31	-.0123 (.07714)	-54.67	-.0296
	NO_X	25	.1518 (.1479)	1.994	.2092

TABLE C-26 LINEAR REGRESSIONS OF SHORT TESTS ON FTP EMISSIONS USED TO OBTAIN THE SHORT CYCLE STANDARDS FOR HC

DEPENDENT VARIABLE (Short Cycle)	NO. CARS	SLOPE	FTP STANDARD	INTERCEPT	SHORT CYCLE STANDARD AT FTP STANDARD
FEDERAL SHORT CYCLE	300	0.899	1.5	-0.1797	1.169
NEW YORK, NEW JERSEY	300	1.423	1.5	-0.1863	1.948
CLAYTON KEY MODE HIGH	200	7.9	1.5	27.824	39.67
CLAYTON KEY MODE LOW	200	13.198	1.5	26.271	46.07
CLAYTON KEY MODE IDLE	200	104.04	1.5	-21.4	134.66
TWO SPEED IDLE AT 2250 RPM	200	14.43	1.5	32.3676	54.01
TWO SPEED IDLE AT IDLE NEUTRAL	200	123.8776	1.5	-25.655	160.16
FEDERAL THREE MODE HIGH	200	11.793	1.5	23.995	41.68
FEDERAL THREE MODE LOW	200	16.0059	1.5	23.2387	47.25
FEDERAL THREE MODE IDLE IN NEUTRAL	200	142.138	1.5	-27.7215	185.49
FEDERAL THREE MODE IDLE IN DRIVE	200	98.4236	1.5	-17.0482	130.59

TABLE C-27 LINEAR REGRESSIONS OF SHORT TESTS ON FTP EMISSIONS USED TO OBTAIN THE SHORT CYCLE STANDARDS FOR CO

DEPENDENT VARIABLE (Short Cycle)	NO. CARS	SLOPE	FTP STANDARD	INTERCEPT	SHORT CYCLE STANDARD AT FTP STANDARD
FEDERAL SHORT CYCLE	300	0.815	15.0	-3.037	9.188
NEW YORK, NEW JERSEY	300	1.471	15.0	-1.954	20.111
CLAYTON KEY MODE HIGH	200	.09834	15.0	-.33715	1.14
CLAYTON KEY MODE LOW	200	.00661	15.0	-.04877	.05
CLAYTON KEY MODE IDLE	200	.07727	15.0	.09839	1.26
TWO SPEED IDLE AT 2250 RPM	200	.01134	15.0	-.08524	.08
TWO SPEED IDLE AT IDLE NEUTRAL	200	.072	15.0	-.02115	1.06
FEDERAL THREE MODE HIGH	200	.007633	15.0	-.06924	.05
FEDERAL THREE MODE LOW	200	.00627	15.0	-.03964	.05
FEDERAL THREE MODE IDLE IN NEUTRAL	200	.078556	15.0	.07922	1.26
FEDERAL THREE MODE IDLE IN DRIVE	200	.07444	15.0	.09952	1.22

TABLE C-28 LINEAR REGRESSIONS OF SHORT TESTS ON FTP EMISSIONS USED TO OBTAIN THE SHORT CYCLE STANDARDS FOR NO_x

DEPENDENT VARIABLE (Short Cycle)	NO. CARS	SLOPE	FTP STANDARD	INTERCEPT	SHORT CYCLE STANDARD AT FTP STANDARD
FEDERAL SHORT CYCLE	300	0.7254	3.1	0.129	2.378
NEW YORK, NEW JERSEY	300	0.680	3.1	0.28	2.388
CLAYTON KEY MODE HIGH	200	553.257	3.1	-82.15	1632.95
CLAYTON KEY MODE LOW	200	306.7532	3.1	-70.68756	880.25
CLAYTON KEY MODE IDLE	200	32.632	3.1	110.377	211.54
TWO SPEED IDLE AT 2250 RPM	200	60.1885	3.1	27.47	214.05
TWO SPEED IDLE AT IDLE NEUTRAL	200	6.60197	3.1	65.6687	86.13
FEDERAL THREE MODE HIGH	200	612.457	3.1	-146.338	1752.28
FEDERAL THREE MODE LOW	200	448.254	3.1	-237.922	1151.67
FEDERAL THREE MODE IDLE IN NEUTRAL	200	11.08577	3.1	52.311	86.68
FEDERAL THREE MODE IDLE IN DRIVE	200	32.7681	3.1	122.1235	223.70

TABLE C-29 EFFECTIVENESS OF THE FEDERAL SHORT CYCLE TO PASS OR FAIL A VEHICLE AS COMPARED TO THE FEDERAL TEST PROCEDURE FOR HC, CO, AND NO_X SEPARATELY ON INITIAL TEST

FAILURE RATE	SHORT CYCLE TEST	FTP HYDROCARBONS			FTP CARBON MONOXIDE			FTP NO_X		
		# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL
10%	NO. CARS PASS	212	58	270	183	87	270	211	59	270
	NO. CARS FAIL	0	30	30	0	30	30	3	27	30
	NO. CARS TOTAL	212	88	300	183	117	300	214	86	300
	CUT POINT (gms/mi)	2.51			38.67			3.49		
20%	NO. CARS PASS	210	30	240	183	57	240	200	40	240
	NO. CARS FAIL	2	58	60	0	60	60	14	46	60
	NO. CARS TOTAL	212	88	300	183	117	300	214	86	300
	CUT POINT (gms/mi)	1.74			24.82			2.85		
30%	NO. CARS PASS	193	17	210	181	29	210	184	26	210
	NO. CARS FAIL	19	71	90	2	88	90	30	60	90
	NO. CARS TOTAL	212	88	300	183	117	300	214	86	300
	CUT POINT (gms/mi)	1.26			14.06			2.44		
40%	NO. CARS PASS	174	6	180	171	9	180	164	16	180
	NO. CARS FAIL	38	82	120	12	108	120	50	70	120
	NO. CARS TOTAL	212	88	300	183	117	300	214	86	300
	CUT POINT (gms/mi)	0.95			6.54			2.14		
50%	NO. CARS PASS	149	1	150	148	2	150	146	4	150
	NO. CARS FAIL	63	87	150	35	115	150	68	82	150
	NO. CARS TOTAL	212	88	300	183	117	300	14	86	300
	CUT POINT (gms/mi)	0.67			3.58			1.93		

TABLE C-30 EFFECTIVENESS OF THE FEDERAL SHORT CYCLE TO PASS OR FAIL A VEHICLE AS COMPARED TO THE FEDERAL TEST PROCEDURE FOR HC, CO AND NO_X COMBINED

FAILURE RATE	SHORT CYCLE TEST	FTP HYDROCARBONS			FTP CARBON MONOXIDE			FTP NO_X		
		# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL
10%	NO. CARS PASS	209	61	270	183	87	270	191	79	270
	NO. CARS FAIL	3	27	30	1	29	30	23	7	30
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		-			40.75			10.80	
20%	NO. CARS PASS	204	36	240	181	59	240	171	69	240
	NO. CARS FAIL	8	52	60	3	57	60	43	17	60
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		4.57			26.16			6.82	
30%	NO. CARS PASS	190	20	210	175	35	210	151	59	210
	NO. CARS FAIL	22	68	90	9	81	90	63	27	90
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT		2.18			18.00			4.50	
40%	NO. CARS PASS	170	10	180	160	20	180	138	42	180
	NO. CARS FAIL	42	78	120	24	96	120	76	44	120
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		1.68			14.06			3.46	
50%	NO. CARS PASS	144	6	150	139	11	150	125	25	150
	NO. CARS FAIL	68	82	150	45	105	150	89	61	150
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		1.45			11.84			2.85	

TABLE C-31 EFFECTIVENESS OF THE NEW YORK AND NEW JERSEY SHORT CYCLE TEST TO PASS OR FAIL A VEHICLE AS COMPARED TO THE FEDERAL TEST PROCEDURE FOR HC, CO AND NO_X SEPARATELY

FAILURE RATE	SHORT CYCLE TEST	FTP HYDROCARBONS			FTP CARBON MONOXIDE			FTP NO_X		
		# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL
10%	NO. CARS PASS	208	62	270	184	86	270	212	58	270
	NO. CARS FAIL	4	26	30	0	30	30	2	28	30
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		3.84			77.77			3.48	
20%	NO. CARS PASS	202	38	240	181	59	240	205	35	240
	NO. CARS FAIL	10	50	60	3	57	60	9	51	60
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		3.07			52.65			2.79	
30%	NO. CARS PASS	194	16	210	177	33	210	190	20	210
	NO. CARS FAIL	18	72	90	7	83	90	24	66	90
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		2.31			35.31			2.45	
40%	NO. CARS PASS	172	8	180	166	14	180	164	16	180
	NO. CARS FAIL	40	80	120	18	102	120	50	70	120
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		1.72			18 30			2.18	
50%	NO. CARS PASS	147	3	150	147	3	150	142	8	150
	NO. CARS FAIL	65	85	150	37	113	150	72	78	150
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		1.18			7.98			1.97	

TABLE C-32 EFFECTIVENESS OF THE NEW YORK AND NEW JERSEY SHORT CYCLE TEST TO PASS OR FAIL A VEHICLE AS COMPARED TO THE FEDERAL TEST PROCEDURE FOR HC, CO and NO_X COMBINED

FAILURE RATE	SHORT CYCLE TEST	FTP HYDROCARBONS			FTP CARBON MONOXIDE			FTP NO_X		
		# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL
10%	NO. CARS PASS	210	60	270	184	86	270	189	81	270
	NO. CARS FAIL	2	28	30	0	30	30	25	5	30
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		8.36			79.45			-	
20%	NO. CARS PASS	199	41	240	178	62	240	169	71	240
	NO. CARS FAIL	13	47	60	6	54	60	45	15	60
	NO. CARS TOTAL	212	88	300.	184	116	300	214	86	300
	CUT POINT (gms/mi)		5.77			54.83			6.52	
30%	NO. CARS PASS	188	22	210	172	38	210	152	58	210
	NO. CARS FAIL	24	66	90	12	78	90	62	28	90
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		4.16			40.02			5.41	
40%	NO. CARS PASS	167	13	180	153	27	180	134	46	180
	NO. CARS FAIL	45	75	120	31	89	120	80	40	120
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		3.03			32.47			3.69	
50%	NO. CARS PASS	141	9	150	130	20	150	122	28	150
	NO. CARS FAIL	71	79	150	54	96	150	92	58	150
	NO. CARS TOTAL	212	88	300	184	116	300	214	86	300
	CUT POINT (gms/mi)		2.64			25.05			2.97	

TABLE C-33 EFFECTIVENESS OF THE TWO SPEED IDLE SHORT CYCLE TEST TO PASS OR FAIL A VEHICLE AS COMPARED TO THE FEDERAL TEST PROCEDURE FOR HC, CO, AND NO_X SEPARATELY

FAILURE RATE	SHORT CYCLE TEST	FTP HYDROCARBONS # CARS PASS	FTP HYDROCARBONS # CARS FAIL	FTP HYDROCARBONS # CARS TOTAL	FTP CARBON MONOXIDE # CARS PASS	FTP CARBON MONOXIDE # CARS FAIL	FTP CARBON MONOXIDE # CARS TOTAL	FTP NO_X # CARS PASS	FTP NO_X # CARS FAIL	FTP NO_X # CARS TOTAL
10%	NO. CARS PASS	140	40	180	126	54	180	144	36	180
	NO. CARS FAIL	3	17	20	0	20	20	10	10	20
	NO. CARS TOTAL	143	57	200	126	74	200	154	46	200
	CUT POINT		HIGH -	IDLE 400		HIGH 5	IDLE 5		HIGH 360	IDLE 640
20%	NO. CARS PASS	138	22	160	124	36	160	131	29	160
	NO. CARS FAIL	5	35	40	2	38	40	23	17	40
	NO. CARS TOTAL	143	57	200	126	74	200	154	46	200
	CUT POINT		HIGH 300	IDLE 240		HIGH 4.2	IDLE 3.4		HIGH 280	IDLE 280
30%	NO. CARS PASS	125	15	140	122	18	140	120	20	140
	NO. CARS FAIL	18	42	60	4	56	60	34	26	60
	NO. CARS TOTAL	143	57	200	126	74	200	154	46	200
	CUT POINT		HIGH 140	IDLE 135		HIGH 2.0	IDLE 1.7		HIGH 225	IDLE 270
40%	NO. CARS PASS	112	8	120	115	5	120	111	9	120
	NO. CARS FAIL	31	49	80	11	69	80	43	37	80
	NO. CARS TOTAL	143	57	200	126	74	200	154	46	200
	CUT POINT		HIGH 85	IDLE 90		HIGH 0.5	IDLE 0.26		HIGH 190	IDLE 195
50%	NO. CARS PASS	96	4	100	96	4	100	94	6	100
	NO. CARS FAIL	47	53	100	30	70	100	60	40	100
	NO. CARS TOTAL	143	57	200	126	74	200	154	46	200
	CUT POINT		HIGH 65	IDLE 64		HIGH 0.03	IDLE 0.05		HIGH 162	IDLE 172

TABLE C-34 EFFECTIVENESS OF THE TWO SPEED IDLE SHORT CYCLE TEST TO PASS OR FAIL A VEHICLE AS COMPARED TO THE FEDERAL TEST PROCEDURE FOR HC, CO AND NO_X COMBINED

		FTP HYDROCARBONS			FTP CARBON MONOXIDE			FTP NO_X		
FAILURE RATE	SHORT CYCLE TEST	# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL
10%	NO. CARS PASS	136	44	180	122	58	180	136	44	180
	NO. CARS FAIL	7	13	20	4	16	20	16	4	20
	NO. CARS TOTAL	143	57	200	126	74	200	152	48	200
	CUT POINT	HIGH -	IDLE 1300		HIGH 0.75	IDLE 7.6		HIGH 1571	IDLE 640	
20%	NO. CARS PASS	134	26	160	122	38	160	119	41	160
	NO. CARS FAIL	9	31	40	4	36	40	33	7	40
	NO. CARS TOTAL	143	57	200	126	74	200	152	48	200
	CUT POINT	HIGH -	IDLE 300		HIGH 0.5	IDLE 4.25		HIGH -	IDLE 360	
30%	NO. CARS PASS	124	16	140	115	25	140	106	34	140
	NO. CARS FAIL	19	41	60	11	49	60	46	14	60
	NO. CARS TOTAL	143	57	200	126	74	200	152	48	200
	CUT POINT	HIGH 165	IDLE -		HIGH -	IDLE 3.2		HIGH 663	IDLE 279	
40%	NO. CARS PASS	111	9	120	104	16	120	94	26	120
	NO. CARS FAIL	32	48	80	22	58	80	58	22	80
	NO. CARS TOTAL	143	57	200	126	74	200	152	48	200
	CUT POINT	HIGH 128	IDLE 380		HIGH -	IDLE 2.5		HIGH 492	IDLE 187	
50%	NO. CARS PASS	94	6	100	90	10	100	81	19	100
	NO. CARS FAIL	49	51	100	36	64	100	71	29	100
	NO. CARS TOTAL	143	57	200	126	74	200	152	48	200
	CUT POINT	HIGH 90	IDLE -		HIGH -	IDLE 1.8		HIGH 360	IDLE 146	

TABLE C-35 EFFECTIVENESS OF THE CLAYTON KEY MODE SHORT CYCLE TEST TO PASS OR FAIL A VEHICLE AS COMPARED TO THE FEDERAL TEST PROCEDURE FOR HC, CO AND NO_X SEPARATELY

FAILURE RATE	SHORT CYCLE TEST	FTP HYDROCARBONS			FTP CARBON MONOXIDE			FTP NO_X		
		# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL
10%	NO. CARS PASS	141	39	180	126	54	180	147	33	180
	NO. CARS FAIL	1	19	20	0	20	20	5	15	20
	NO. CARS TOTAL	142	58	200	126	74	200	152	48	200
		HIGH	LOW	IDLE	HIGH	LOW	IDLE	HIGH	LOW	IDLE
	CUT POINT	-	-	320	7.4	-	5.9	2361	2400	-
20%	NO. CARS PASS	137	23	160	125	35	160	134	26	160
	NO. CARS FAIL	5	35	40	1	39	40	18	22	40
	NO. CARS TOTAL	142	58	200	126	74	200	152	48	200
		HIGH	LOW	IDLE	HIGH	LOW	IDLE	HIGH	LOW	IDLE
	CUT POINT	250	-	235	-	-	4.0	2000	2050	-
30%	NO. CARS PASS	129	11	140	122	18	140	122	18	140
	NO. CARS FAIL	13	47	60	4	56	60	30	30	60
	NO. CARS TOTAL	142	58	200	126	74	200	152	48	200
		HIGH	LOW	IDLE	HIGH	LOW	IDLE	HIGH	LOW	IDLE
	CUT POINT	-	145	135	-	3.6	2.2	1746	1750	-
40%	NO. CARS PASS	114	6	120	116	4	120	107	13	120
	NO. CARS FAIL	28	52	80	10	70	80	45	35	80
	NO. CARS TOTAL	142	58	200	126	74	200	152	48	200
		HIGH	LOW	IDLE	HIGH	LOW	IDLE	HIGH	LOW	IDLE
	CUT POINT	80	85	81	0.8	0.65	0.65	1442	1451	-
50%	NO. CARS PASS	96	4	100	99	1	100	92	8	100
	NO. CARS FAIL	46	54	100	27	73	100	60	40	100
	NO. CARS TOTAL	142	58	200	126	74	200	152	48	200
		HIGH	LOW	IDLE	HIGH	LOW	IDLE	HIGH	LOW	IDLE
	CUT POINT	60	60	60	0.09	0.09	0.10	1229	1250	-

TABLE C-36 EFFECTIVENESS OF THE CLAYTON KEY MODE SHORT CYCLE TEST TO PASS OR FAIL A VEHICLE AS COMPARED TO THE FEDERAL TEST PROCEDURE FOR HC, CO AND NO_X COMBINED

FAILURE RATE	SHORT CYCLE TEST	FTP HYDROCARBONS			FTP CARBON MONOXIDE			FTP NO_X		
		# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL
10%	NO. CARS PASS	140	40	180	126	54	180	135	45	180
	NO. CARS FAIL	2	18	20	0	20	20	17	3	20
	NO. CARS TOTAL	142	58	200	126	74	200	152	48	200
	CUT POINT	HIGH 250	LOW -	IDLE -	HIGH 8.0	LOW 0.31	IDLE 6.9	HIGH -	LOW -	IDLE -
20%	NO. CARS PASS	134	26	160	120	40	160	121	39	160
	NO. CARS FAIL	8	32	40	6	34	40	31	9	40
	NO. CARS TOTAL	142	58	200	126	74	200	152	48	200
	CUT POINT	HIGH -	LOW -	IDLE 550	HIGH -	LOW 0.22	IDLE 5.0	HIGH -	LOW -	IDLE 840
30%	NO. CARS PASS	124	16	140	113	27	140	109	31	140
	NO. CARS FAIL	18	42	60	13	47	60	43	17	60
	NO. CARS TOTAL	142	58	200	126	74	200	152	48	200
	CUT POINT	HIGH -	LOW 145	IDLE 410	HIGH -	LOW 0.15	IDLE 3.8	HIGH 5566	LOW 2698	IDLE 644
40%	NO. CARS PASS	110	10	120	102	18	120	94	26	120
	NO. CARS FAIL	32	48	80	24	56	80	58	22	80
	NO. CARS TOTAL	142	58	200	126	74	200	152	48	200
	CUT POINT	HIGH 95	LOW 110	IDLE 315	HIGH -	LOW 0.13	IDLE 3.0	HIGH 3963	LOW 2050	IDLE 511
50%	NO. CARS PASS	91	9	100	86	14	100	78	22	100
	NO. CARS FAIL	51	49	100	40	60	100	74	26	100
	NO. CARS TOTAL	142	58	200	126	74	200	152	48	200
	CUT POINT	HIGH 80	LOW 100	IDLE 280	HIGH -	LOW 0.11	IDLE 2.6	HIGH -	LOW 1779	IDLE 430

TABLE C-37 EFFECTIVENESS OF THE FEDERAL THREE MODE SHORT CYCLE TEST TO PASS OR FAIL A VEHICLE AS COMPARED TO THE FEDERAL TEST PROCEDURE FOR HC, CO, AND NO_X SEPARATELY

FAILURE RATE	SHORT CYCLE TEST	FTP HYDROCARBONS # CARS PASS	FTP HYDROCARBONS # CARS FAIL	FTP HYDROCARBONS # CARS TOTAL	FTP CARBON MONOXIDE # CARS PASS	FTP CARBON MONOXIDE # CARS FAIL	FTP CARBON MONOXIDE # CARS TOTAL	FTP NO_X # CARS PASS	FTP NO_X # CARS FAIL	FTP NO_X # CARS TOTAL
10%	NO. CARS PASS	139	41	180	124	56	180	149	31	180
	NO. CARS FAIL	3	17	20	2	18	20	4	16	20
	NO. CARS TOTAL	142	58	200	126	74	200	153	47	200
	CUT POINT	HIGH LOW -- --	IDLE DR. 510	IDLE NE. 490	HIGH LOW 7.6 --	IDLE DR. 5.8	IDLE NE. 6.0	HIGH LOW 2361 2400	IDLE DR. --	IDLE NE. --
20%	NO. CARS PASS	137	23	160	124	36	160	136	24	160
	NO. CARS FAIL	5	35	40	2	38	40	17	23	40
	NO. CARS TOTAL	142	58	200	126	74	200	153	47	200
	CUT POINT	HIGH LOW -- --	IDLE DR. 480	IDLE NE. 480	HIGH LOW -- --	IDLE DR. 4.2	IDLE NE. 4.3	HIGH LOW 2100 2192	IDLE DR. --	IDLE NE. --
30%	NO. CARS PASS	126	14	140	121	19	140	124	16	140
	NO. CARS FAIL	16	44	60	5	55	60	29	31	60
	NO. CARS TOTAL	142	58	200	126	74	200	153	47	200
	CUT POINT	HIGH LOW 270 260	IDLE DR. 280	IDLE NE. 270	HIGH LOW -- 3.0	IDLE DR. 2.5	IDLE NE. 2.6	HIGH LOW 1813 1829	IDLE DR. --	IDLE NE. --
40%	NO. CARS PASS	111	9	120	115	5	120	108	12	120
	NO. CARS FAIL	31	49	80	11	69	80	45	35	80
	NO. CARS TOTAL	142	58	200	126	74	200	153	47	200
	CUT POINT	HIGH LOW 130 150	IDLE DR. 168	IDLE NE. 160	HIGH LOW 1.2 1.4	IDLE DR. 1.0	IDLE NE. 0.9	HIGH LOW 1636 1650	IDLE DR. --	IDLE NE. --
50%	NO. CARS PASS	96	4	100	99	1	100	91	9	100
	NO. CARS FAIL	46	54	100	27	73	100	62	38	100
	NO. CARS TOTAL	142	58	200	126	74	200	153	47	200
	CUT POINT	HIGH LOW 90 90	IDLE DR. 82	IDLE NE. 88	HIGH LOW 0.11 0.11	IDLE DR. 0.10	IDLE NE. 0.10	HIGH LOW 1450 1498	IDLE DR. --	IDLE NE. --

TABLE C-38 EFFECTIVENESS OF THE FEDERAL THREE MODE SHORT CYCLE TEST TO PASS OR FAIL A VEHICLE AS COMPARED TO THE FEDERAL TEST PROCEDURE FOR HC, CO, AND NO_X COMBINED

FAILURE RATE	SHORT CYCLE TEST	FTP HYDROCARBONS			FTP CARBON MONOXIDE			FTP NO_X		
		# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL	# CARS PASS	# CARS FAIL	# CARS TOTAL
10%	NO. CARS PASS	134	46	180	121	59	180	139	41	180
	NO. CARS FAIL	8	12	20	5	15	20	14	6	20
	NO. CARS TOTAL	142	58	200	126	74	200	153	47	200
	CUT POINT	HIGH LOW	IDLE DR.	IDLE NE.	HIGH LOW	IDLE DR.	IDLE NE.	HIGH LOW	IDLE DR.	IDLE NE.
		-- --	--	1400	0.35 0.44	9.5	8.6	-- --	--	700
20%	NO. CARS PASS	132	28	160	118	42	160	122	38	160
	NO. CARS FAIL	10	30	40	8	32	40	31	9	40
	NO. CARS TOTAL	142	58	200	126	74	200	153	47	200
	CUT POINT	HIGH LOW	IDLE DR.	IDLE NE.	HIGH LOW	IDLE DR.	IDLE NE.	HIGH LOW	IDLE DR.	IDLE NE.
		270 260	620	770	0.25 0.25	5.2	5.3	-- --	940	549
30%	NO. CARS PASS	122	18	140	110	30	140	111	29	140
	NO. CARS FAIL	20	40	60	16	44	60	42	18	60
	NO. CARS TOTAL	142	58	200	126	74	200	153	47	200
	CUT POINT	HIGH LOW	IDLE DR.	IDLE NE.	HIGH LOW	IDLE DR.	IDLE NE.	HIGH LOW	IDLE DR.	IDLE NE.
		-- 175	440	670	0.2 0.2	4.2	4.1	-- 4048	800	328
40%	NO. CARS PASS	108	12	120	97	23	120	96	24	120
	NO. CARS FAIL	34	46	80	29	51	80	57	23	80
	NO. CARS TOTAL	142	58	200	126	74	200	153	47	200
	CUT POINT	HIGH LOW	IDLE DR.	IDLE NE.	HIGH LOW	IDLE DR.	IDLE NE.	HIGH LOW	IDLE DR.	IDLE NE.
		-- 150	380	550	0.15 --	3.6	3.5	5060 3373	660	245
50%	NO. CARS PASS	91	9	100	84	16	100	81	19	100
	NO. CARS FAIL	51	49	100	42	58	100	72	28	100
	NO. CARS TOTAL	142	58	200	126	74	200	153	47	200
	CUT POINT	HIGH LOW	IDLE DR.	IDLE NE.	HIGH LOW	IDLE DR.	IDLE NE.	HIGH LOW	IDLE DR.	IDLE NE.
		90 105	290	420	0.11 0.11	2.8	2.7	4000 2698	511	200

TABLE C-39 CLAYTON KEY MODE MEAN FTP EMISSIONS
HC ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	141	0.805	0.34
20	137	0.792	0.334
30	129	0.777	0.33
40	114	0.738	0.315
50	96	0.695	0.3

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	39	2.256	0.799
20	23	1.907	0.375
30	11	1.844	0.336
40	6	1.876	0.246
50	4	1.83	0.263

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	1	0.877	-
20	5	1.173	0.266
30	13	1.092	0.299
40	28	1.08	0.295
50	46	1.04	0.297

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	19	3.17	1.2
20	35	2.98	1.11
30	47	2.72	1.07
40	52	2.63	1.06
50	54	2.61	1.05

TABLE C-40 CLAYTON KEY MODE MEAN FTP EMISSIONS
CO ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	126	5.977	3.46
20	125	5.97	3.48
30	122	5.94	3.43
40	116	5.77	3.39
50	99	5.45	3.2

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	54	38.87	23.37
20	35	28.92	10.78
30	18	25.32	10.22
40	4	21.64	6.29
50	1	16.97	-

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	0	-	-
20	1	6.44	-
30	4	6.97	4.8
40	10	8.32	3.65
50	27	7.9	3.75

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	20	54.22	20.44
20	39	55.67	24.69
30	56	48.71	23.77
40	70	44.24	23.54
50	73	43.38	23.46

TABLE C-41 CLAYTON KEY MODE
MEAN FTP EMISSIONS
NOX ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	147	2.22	0.494
20	134	2.19	0.493
30	122	2.18	0.496
40	107	2.14	0.487
50	92	2.09	0.47

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	33	3.65	0.414
20	26	3.67	0.441
30	18	3.69	0.496
40	13	3.82	0.513
50	8	3.88	0.629

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	5	2.13	0.477
20	18	2.42	0.452
30	30	2.40	0.442
40	45	2.41	0.459
50	60	2.42	0.464

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	15	5.58	1.7
20	22	4.95	1.69
30	30	4.59	1.56
40	35	4.42	1.51
50	40	4.33	1.43

TABLE C-42 FEDERAL 3 MODE
FTP MEAN EMISSIONS
HC ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	139	0.798	0.337
20	137	0.798	0.339
30	126	0.768	0.329
40	111	0.723	0.309
50	96	0.69	0.296

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	41	2.41	1.0
20	23	1.97	0.65
30	14	1.82	0.298
40	9	1.72	0.203
50	4	1.823	0.245

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	3	1.148	0.292
20	5	1.01	0.286
30	16	1.1	0.27
40	31	1.1	0.275
50	46	1.05	0.294

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	17	2.987	1.06
20	35	2.938	1.07
30	44	2.79	1.08
40	49	2.71	1.05
50	54	2.61	1.05

TABLE C-43 FEDERAL 3 MODE
FTP MEAN EMISSIONS
CO ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	124	5.97	3.48
20	124	5.97	3.48
30	121	5.93	3.44
40	115	5.75	3.39
50	99	5.23	3.06

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	56	37.75	18.99
20	36	31.39	17.21
30	19	23.31	6.52
40	5	19.6	4.72
50	1	16.97	-

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	2	6.27	2.67
20	2	6.27	2.67
30	5	7.2	4.19
40	11	8.35	3.45
50	27	8.7	3.54

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	18	59.41	28.78
20	38	54.04	23.52
30	55	49.83	23.42
40	69	44.72	23.41
50	73	43.38	23.46

TABLE C-44 FEDERAL 3 MODE FTP MEAN EMISSIONS
NOX ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	149	2.2	0.492
20	136	2.19	0.496
30	124	2.16	0.497
40	108	2.11	0.49
50	91	2.07	0.484

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	31	3.62	0.347
20	24	3.61	0.356
30	16	3.61	0.4
40	12	3.69	0.408
50	9	3.73	0.469

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	4	2.7	0.239
20	17	2.46	0.406
30	29	2.49	0.37
40	45	2.49	0.39
50	62	2.44	0.42

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	16	5.53	1.67
20	23	4.897	1.63
30	31	4.58	1.52
40	35	4.44	1.49
50	38	4.38	1.44

TABLE C-45 NEW YORK, NEW JERSEY
HC ONLY
MEAN FTP EMISSIONS

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	208	0.809	0.336
20	202	0.796	0.329
30	194	0.779	0.322
40	172	0.746	0.310
50	147	0.693	0.277

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	62	2.19	0.653
20	38	2.02	0.512
30	16	1.74	0.217
40	8	1.68	0.176
50	3	1.66	0.108

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	4	1.06	0.216
20	10	1.18	0.259
30	18	1.19	0.229
40	40	1.11	0.279
50	65	1.09	0.296

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	26	3.42	1.05
20	50	2.96	1.03
30	72	2.73	0.976
40	80	2.64	0.969
50	85	2.58	0.968

TABLE C-46 NEW YORK, NEW JERSEY
MEAN FTP EMISSIONS
CO ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	184	6.11	3.43
20	181	6.11	3.45
30	177	6.14	3.47
40	166	6.16	3.46
50	147	5.75	3.09

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	86	34.38	16.66
20	59	28.7	11.83
30	33	23.27	7.83
40	14	20.27	5.93
50	3	23.09	12.04

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	0	0	0
20	3	6.25	2.01
30	7	5.475	2.19
40	18	5.63	3.15
50	37	7.56	4.29

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	30	66.55	23.13
20	57	57.19	23.33
30	83	50.42	22.83
40	102	45.78	23.05
50	113	43.22	23.27

TABLE C-47 NEW YORK, NEW JERSEY
MEAN FTP EMISSIONS
NOX ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	212	2.24	0.476
20	205	2.22	0.476
30	190	2.21	0.48
40	164	2.14	0.468
50	142	2.12	0.476

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	58	3.69	0.564
20	35	3.53	0.356
30	20	3.53	0.418
40	16	3.56	0.419
50	8	3.44	0.296

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	2	3.01	0.09
20	9	2.78	0.209
30	24	2.52	0.38
40	50	2.57	0.364
50	72	2.49	0.386

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	28	5.45	1.72
20	51	4.75	1.54
30	66	4.49	1.46
40	70	4.43	1.44
50	78	4.35	1.39

TABLE C-48 FEDERAL SHORT CYCLE MEAN FTP EMISSIONS
HC ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	212	0.814	0.336
20	210	0.812	0.337
30	193	0.776	0.320
40	174	0.735	0.303
50	149	0.67	0.259

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	58	2.137	0.514
20	30	1.872	0.343
30	17	1.681	0.161
40	6	1.686	0.19
50	1	1.69	-

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	0	0	0
20	2	0.994	0.165
30	19	1.2	0.236
40	38	1.18	0.222
50	63	1.16	0.23

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	30	3.35	1.127
20	58	2.90	0.997
30	71	2.76	0.962
40	82	2.61	0.969
50	87	2.55	0.966

TABLE C-49 FEDERAL SHORT CYCLE MEAN FTP EMISSIONS
CO ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	183	6.11	3.43
20	183	6.11	3.43
30	181	6.08	3.43
40	171	5.91	3.38
50	148	5.43	3.03

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	87	33.52	13.82
20	57	28.09	12.05
30	29	21.64	6.22
40	9	21.43	7.12
50	2	26.91	14.21

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	0	0	0
20	0	0	0
30	2	9.01	0.949
40	12	8.73	3.09
50	35	8.93	3.56

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	30	69.01	24.81
20	60	56.33	22.93
30	88	49.4	22.67
40	108	44.49	23.25
50	115	42.98	23.31

TABLE C-50 FEDERAL SHORT CYCLE MEAN FTP EMISSIONS
NOX ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	211	2.24	0.482
20	200	2.22	0.485
30	184	2.19	0.482
40	164	2.15	0.488
50	146	2.09	0.47

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	59	3.61	0.407
20	40	3.57	0.331
30	26	3.4	0.194
40	16	3.36	0.17
50	4	3.41	0.126

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	27	5.69	1.6
20	14	2.58	0.213
30	30	2.58	0.299
40	50	2.54	0.3
50	68	2.56	0.323

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	3	2.51	0.24
20	46	4.86	1.6
30	60	4.64	1.47
40	70	4.47	1.42
50	82	4.32	1.38

TABLE C-51 TWO SPEED IDLE MEAN FTP EMISSIONS
HC ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	140	0.796	0.334
20	138	0.799	0.335
30	125	0.76	0.323
40	112	0.726	0.311
50	96	0.686	0.292

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	40	2.38	0.995
20	22	1.92	0.415
30	15	1.97	0.423
40	8	1.86	0.344
50	4	2.01	0.393

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	3	1.24	0.317
20	5	0.979	0.432
30	18	1.11	0.289
40	31	1.09	0.278
50	47	1.05	0.297

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	17	2.97	1.04
20	35	2.97	1.11
30	42	2.78	1.11
40	49	2.68	1.07
50	53	2.61	1.06

TABLE C-52 TWO SPEED IDLE MEAN FTP EMISSIONS
CO ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	126	5.98	3.46
20	124	5.98	3.48
30	122	5.90	3.44
40	115	5.63	3.24
50	96	5.26	3.01

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	54	38.07	21.56
20	36	29.04	10.19
30	18	24.09	6.34
40	5	23.22	9.29
50	4	25.15	9.51

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	0	-	-
20	2	5.95	2.22
30	4	8.18	4.03
40	11	9.64	3.73
50	30	8.27	3.86

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	20	56.38	23.83
20	38	56.27	24.91
30	56	49.10	23.78
40	69	44.46	23.60
50	70	44.04	23.68

TABLE C-53 TWO SPEED IDLE MEAN FTP EMISSIONS
NOX ONLY

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	144	2.21	0.505
20	131	2.20	0.512
30	120	2.16	0.507
40	111	2.13	0.502
50	94	2.07	0.487

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	36	3.98	0.955
20	29	3.81	0.68
30	20	3.84	0.793
40	9	3.66	0.382
50	6	3.78	0.415

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	10	2.37	0.195
20	23	2.36	0.33
30	34	2.43	0.37
40	43	2.47	0.37
50	60	2.47	0.39

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	10	5.17	1.98
20	17	4.997	1.8
30	26	4.55	1.57
40	37	4.39	1.44
50	40	4.32	1.41

TABLE C-54 CLAYTON KEY MODE MEAN NOX EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	140	0.803	0.34
20	134	0.8	0.34
30	124	0.796	0.331
40	110	0.784	0.316
50	91	0.743	0.312

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	40	2.27	0.761
20	26	2.15	0.715
30	16	1.83	0.295
40	10	1.81	0.259
50	9	1.78	0.255

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	2	0.986	0.154
20	8	0.907	0.382
30	18	0.875	0.394
40	32	0.879	0.406
50	51	0.916	0.359

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	18	3.19	1.28
20	32	2.94	1.16
30	42	2.83	1.08
40	48	2.71	1.07
50	49	2.70	1.06

TABLE C-55 MEAN CO EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	126	5.98	3.46
20	120	6.0	3.47
30	113	6.07	3.54
40	102	6.01	3.55
50	86	6.0	3.59

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	54	37.03	16.15
20	40	34.21	16.15
30	27	27.98	10.68
40	18	27.83	10.98
50	14	27.47	12.44

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	0	-	-
20	6	5.67	2.97
30	13	5.15	2.67
40	24	5.85	3.15
50	40	5.91	3.21

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	20	59.19	31.89
20	34	53.97	25.99
30	47	51.66	24.55
40	56	47.9	24.41
50	60	46.65	24.05

TABLE C-56 CLAYTON KEY MODE MEAN NOX EMISSIONS FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	135	2.26	0.479
20	121	2.25	0.493
30	109	2.24	0.494
40	94	2.22	0.497
50	78	2.19	0.52

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	45	4.17	1.29
20	39	4.11	1.2
30	31	3.83	0.832
40	26	3.73	0.646
50	22	3.67	0.45

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	17	1.92	0.515
20	31	2.10	0.481
30	43	2.16	0.491
40	58	2.22	0.489
50	74		

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	3	5.48	1.72
20	9	4.63	1.47
30	17	5.02	1.73
40	22	4.87	1.67
50	26		

TABLE C-57 TWO-SPEED IDLE MEAN HC EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	136	0.798	0.337
20	134	0.79	0.33
30	124	0.752	0.31
40	111	0.733	0.303
50	94	0.713	0.291

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	44	2.47	1.06
20	26	2.47	1.22
30	16	1.903	0.408
40	9	1.93	0.467
50	6	1.99	0.576

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	7	0.947	0.371
20	9	1.06	0.39
30	19	1.15	0.318
40	32	1.07	0.336
50	49	0.987	0.354

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	13	2.86	0.924
20	31	2.78	0.98
30	41	2.85	1.1
40	48	2.67	1.07
50	51	2.62	1.07

TABLE C-58 MEAN CO EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	122	5.93	3.41
20	122	5.93	3.41
30	115	5.89	3.43
40	104	5.87	3.45
50	90	5.8	3.55

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	58	39.67	18.47
20	38	36.55	18.32
30	25	28.96	9.92
40	16	25.29	7.52
50	10	24.58	5.93

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	4	7.38	5.25
20	4	7.38	5.25
30	11	6.87	3.88
40	22	6.47	3.54
50	36	6.41	3.25

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	16	55.17	34.5
20	36	51.07	25.73
30	49	50.19	25.2
40	58	47.91	24.08
50	64	45.9	23.93

TABLE C-59 TWO SPEED IDLE MEAN NOX EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	136	2.22	0.518
20	119	2.23	0.509
30	106	2.23	0.51
40	94	2.25	0.52
50	81	2.25	0.53

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	44	4.21	1.31
20	41	4.2	1.3
30	34	4.11	1.35
40	26	3.78	0.637
50	19	3.73	0.46

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	16	2.18	0.5
20	33	2.18	0.433
30	46	2.2	0.456
40	58	2.17	0.448
50	71		

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	4	4.76	1.75
20	7	5.03	1.58
30	14	4.61	1.27
40	22	4.82	1.7
50	29	4.36	1.7

TABLE C-60 FEDERAL SHORT CYCLE MEAN HC EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	209	0.810	0.334
20	204	0.803	0.330
30	190	0.785	0.321
40	170	0.767	0.313
50	144	0.737	0.302

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	61	2.35	0.862
20	36	2.15	0.61
30	20	1.92	0.41
40	10	1.83	0.254
50	6	1.67	0.106

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	3	1.09	0.42
20	8	1.09	0.391
30	22	1.06	0.362
40	42	1.01	0.359
50	68	0.979	0.346

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	27	3.0	1.05
20	52	2.83	1.07
30	68	2.74	1.0
40	78	2.64	0.984
50	82	2.62	0.969

TABLE C-61 MEAN CO EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	183	6.13	3.43
20	181	6.14	3.44
30	175	6.06	3.39
40	160	5.96	3.37
50	139	5.92	3.33

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	87	33.7	13.89
20	59	28.52	11.88
30	35	23.78	7.66
40	20	21.35	6.55
50	11	20.12	5.83

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	1	2.74	-
20	3	4.07	2.23
30	9	7.05	4.29
40	24	7.09	3.75
50	45	6.71	3.7

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	29	69.6	25.04
20	57	57.37	23.07
30	81	50.87	22.97
40	36	47.15	23.01
50	105	45.06	23.12

TABLE C- 62 FEDERAL SHORT CYCLE MEAN NOX EMISSIONS FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	191	2.24	0.484
20	171	2.25	0.486
30	151	2.25	0.493
40	138	2.25	0.494
50	125	2.23	0.492

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	79	4.26	1.38
20	69	4.0	1.03
30	59	3.79	0.672
40	42	3.58	0.381
50	25	3.54	0.32

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	23	2.32	0.446
20	43	2.24	0.459
30	63	2.22	0.451
40	76	2.24	0.456
50	89	2.26	0.465

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	7	4.31	1.11
20	17	5.35	1.92
30	27	5.31	1.83
40	44	4.91	1.61
50	61	4.56	1.5

TABLE C-63 FEDERAL THREE MODE MEAN HC EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	134	0.805	0.34
20	132	0.803	0.34
30	122	0.788	0.324
40	108	0.776	0.312
50	91	0.755	0.308

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	46	2.5	1.04
20	28	2.42	1.13
30	18	2.23	1.15
40	12	1.86	0.316
50	9	1.89	0.358

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	8	0.823	0.345
20	10	0.838	0.333
30	20	0.912	0.407
40	34	0.896	0.401
50	51	0.894	0.373

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	12	2.76	1.03
20	30	2.8	1.0
30	40	2.71	0.952
40	46	2.76	1.08
50	49	2.69	1.08

TABLE C-64 MEAN CO EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	121	5.91	3.46
20	118	5.9	3.47
30	110	5.86	3.5
40	97	5.86	3.48
50	84	5.91	3.53

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	59	41.45	19.55
20	42	38.62	19.53
30	30	32.47	18.27
40	23	26.76	8.92
50	16	25.73	9.14

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	5	7.51	3.47
20	8	7.05	3.43
30	16	6.78	3.01
40	29	6.39	3.44
50	42	6.11	3.37

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	15	49.18	35.29
20	32	50.26	26.43
30	44	50.21	24.12
40	51	50.35	24.39
50	58	47.79	24.05

TABLE C-65 FEDERAL THREE MODE MEAN NOX EMISSIONS FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	139	2.25	0.463
20	122	2.24	0.478
30	111	2.22	0.48
40	96	2.22	0.47
50	81	2.22	0.463

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	41	4.27	1.36
20	38	4.27	1.36
30	29	4.03	1.22
40	24	3.77	0.638
50	19	3.83	0.665

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	14	1.98	0.703
20	31	2.14	0.548
30	42	2.22	0.528
40	57	2.22	0.528
50	72	2.22	0.527

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	6	4.11	1.32
20	9	4.52	1.54
30	18	4.62	1.48
40	23	4.78	1.68
50	28	4.56	1.6

TABLE C-66 NEW YORK, NEW JERSEY
MEAN HC EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	210	0.811	0.335
20	199	0.797	0.327
30	188	0.781	0.321
40	167	0.764	0.316
50	141	0.757	0.313

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	60	2.39	0.9
20	41	2.2	0.7
30	22	2.04	0.593
40	13	1.78	0.201
50	9	1.79	0.211

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	2	1.13	0.353
20	13	1.08	0.363
30	24	1.07	0.343
40	45	0.999	0.345
50	71	0.928	0.352

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	28	2.9	1.02
20	47	2.86	1.07
30	66	2.72	1.01
40	75	2.69	0.983
50	79	2.64	0.98

TABLE C-67 MEAN CO EMISSIONS
FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	184	6.11	3.43
20	178	6.11	3.48
30	172	6.09	3.47
40	153	6.16	3.45
50	130	6.22	3.54

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	86	34.54	16.76
20	62	29.30	12.22
30	38	25.46	12.25
40	27	23.23	8.39
50	20	21.07	6.69

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	0	-	-
20	6	6.15	1.57
30	12	6.35	2.89
40	31	5.89	3.39
50	54	5.84	3.16

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	30	66.1	23.56
20	54	58.08	23.44
30	78	51.1	22.73
40	89	48.60	23.1
50	96	47.2	22.94

TABLE C-68 NEW YORK, NEW JERSEY MEAN NOX EMISSIONS FAILURE RATES FOR HC, CO, NOX

PASS SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	189	2.23	0.49
20	169	2.24	0.494
30	152	2.26	0.486
40	134	2.25	0.481
50	122	2.25	0.478

PASS SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	81	4.26	1.36
20	71	4.07	1.17
30	58	3.79	0.684
40	46	2.74	0.684
50	28	3.52	0.282

FAIL SHORT TEST, PASS FTP

Rate	N	Mean	SD
10	25	2.33	0.388
20	45	2.27	0.426
30	62	2.22	0.468
40	80	2.24	0.48
50	92	2.24	0.48

FAIL SHORT TEST, FAIL FTP

Rate	N	Mean	SD
10	5	4.41	1.33
20	15	5.2	1.78
30	28	5.24	1.82
40	40	4.87	1.66
50	58	4.63	1.51